ConITS II

Presolicitation Conference

Langley Research Center

October 20, 2008

Agenda

9:00	Presentations
12:00	Lunch
1:15	Tour
4:00	Tour and Conference Complete

Agenda for Presentations

Introduction	Tom Brinkley	9:00
SOW		
General Overview	Tom Brinkley	9:10
General IT Support Services	Tom Brinkley	9:20
IT Security	John Evans	9:35
Central Web and Database Servers	John Evans	9:45
Business Computing	Connie Basnett	9:55
Break		10:10
SOW		
Central Storage System	Duane Melson	10:20
High Performance Computing	Joe Morrison	10:35
AEEB Modeling & Simulation Support	Pat Kerr	10:50
Geographic Information Systems (GIS)	Brad Ball	11:15
ATOS Development and Enhancements	Tony Busquets	11:30
Procurement Specifics & Due Diligence	Robert Rice	11:45

Questions and Answers

- Questions may be asked at the end of each presentation
- Questions during the tours that relate to the facility, equipment, or work being performed in that area will be taken from the floor
- We will answer as many questions as possible today at the conference
- Questions related to the TOR terms and conditions, evaluation criteria, SOW will be answered in writing and posted to the bidders library or will be reflected in the TOR itself

ConITS II

Introduction

Thomas H. Brinkley
Office of the CIO

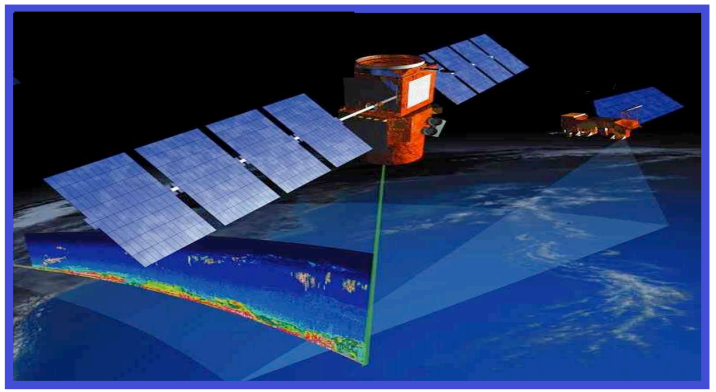
Langley Research Center Mission

Exploration

- Orion crew safety and entry/landing systems
- Ares 1 and V flight characterization
- Ares 1 first flight systems engineering & integration
- Lunar Lander and Surface structures & mechanisms
- Exploration Technology Development

Science

- Earth-Observing Satellites: CALIPSO and CERES FM-5; Future: CERES, CLARREO
- Science for Society: Air Quality, Weather, and Climate Change
- Advanced technology and instrument design



Aeronautics

- Fundamental Aero: Subsonic to Hypersonic
- Aviation Safety: Aircraft Health and Control Technologies and Systems
- Airspace Systems: Next-Generation Air Transportation Systems and Technologies

NASA Langley and our highly skilled workforce are critical to NASA's Mission.

Langley Research Center (2008)

Infrastructure/Facilities

- 788 acres, 241 Buildings
- $2.7 B replacement value

Founded in 1917

1st civil aeronautical research laboratory

$735 M Budget for FY09

~$720 NASA Langley budget

~$15M External business

FY09 Workforce

~1,900 Civil Servants Full Time Equivalents

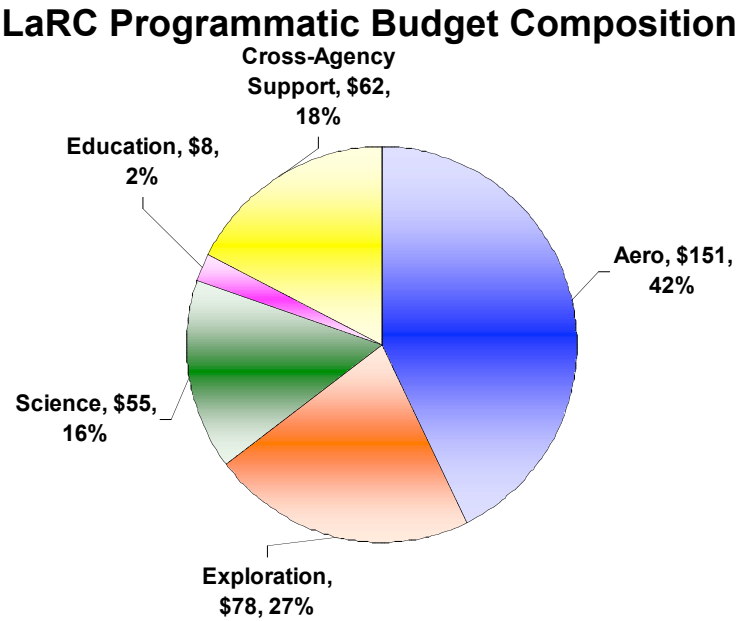
~1,600 Onsite Contractor Workyears

Langley's National Impact (2007)

- Economic output of ~ $2B annually
- Generates 15,800 high-tech jobs
- Invests over $~20M in educational institutions

Langley's Virginia Impact (2007)

- Economic output of ~ $1.1B annually
- Generates 10,400 high-tech jobs



Major ConITS Customers

These organizations account for about 90% of the services provided under ConITS:

Mission Organizations

- Research & Technology Directorate
- Center Operations Directorate
- Systems Engineering Directorate

Mission Support Organizations

- Office of Chief Information Officer
- Office of the Chief Financial Officer

ConITS II

General Overview

Thomas H. Brinkley
Office of the CIO

General SOW Requirements

- Place of Performance
  - LaRC On-site
  - Contractor site
  - Non LaRC locations
- Hours of Operation
- Contractor shall provide an electronic Task Assignment system to initiate new TA's, to route TA's through the approval process, to award TA's, and to administer funding and performance of TA's once they are in place
- Contractor is required to use ODIN for desktop systems and off-site connectivity to be used on Task Order
- TOR will define specifics that Contractor will address in their proposal

ConITS II Overview

- Contract is Task Order under GSA Millennia Contract
- SOW functional areas:
  - General IT Support Services
  - System & Application Development Services
  - Work-Area Specific Services
- Task Assignments will be issued for specific work within the SOW
- Each Task Assignment has specific requirements & awarded value
  - Funded separately, with funding limitations applicable
  - Monitored separately (semi-annual by technical monitor)
  - Financial & technical performance reported on monthly basis

ConITS II Overview

- Currently about 90 active Task Assignments
- Contract divided roughly equally between—
  - Research Computing & Advanced Engineering, e.g., Surface Modeling and Grid Generation, Geographic Information System (GIS), Airspace and Traffic Operations Simulation (ATOS)
  - SA & IT Services & Support, e.g., IT Security, Organizational System Administration, Central Storage System (CSS)
  - Enterprise Applications, e.g., Integrated Enterprise Management Program (IEMP) Applications, Software Engineering Process Group (SEPG), Web Development & Database Services

ConITS II Overview

- Agency OCIO is in process of creating new, consolidated contracts for IT services as part of the I^3P Acquisition
- Greatest known impact to ConITS II will be in area of End-User Services (“ODIN”)
- Impacts in other ConITS II areas will be assessed as those contracts are placed
- Task Assignment structure of ConITS II allows flexibility to adjust to Agency changes

General SOW Requirements

- ConITS provides computing support services (including system administration, application development and support, and hardware and software maintenance) for systems that are either uniquely configured or highly specialized in function and are not providing office automation services for end users
- ConITS services typically involve a wide range of integrated support functions including those for nonstandard operating systems, system interfaces, or for use within a dynamic environment such as a research laboratory or test facility.
- Services will cover services not in the scope of those obtained via the Agency I^3P Initiative

General SOW Requirements

- CONITS will provide highly specialized Research Computing and Advanced Engineering Support to LaRC
  - Supports IT that is an embedded component of unique research and development efforts that requires applications knowledge and experience of the research area in which it will be used
  - IT systems under CONITS are dedicated to R&D and Lab pursuits, which are inherently evolutionary
  - Applications management under CONITS is tied to unique R&D needs which require an understanding of the purpose and underlying complexity of the R&D being performed in order to tailor the IT applications to meet the requirements
  - Variability of R&D solutions drives the need for varying levels of expertise (often very advanced) needed for high-end, complex systems and applications

ConITS II

IT Security

John L. Evans
Office of the CIO

IT Security (ITS) Functions

- Caveats
- Incident Response
- Intrusion Detection
- Vulnerability scanning
- Risk Analysis & assessment
- LaRC Center facility-specific firewalls
- IT Security website
- Automating ITS functions
- Coordinate ITS activities with other centers
- Coordinate ITS activities with other contractors

Caveats

- The Agency is currently undergoing an enormous amount of change in the infrastructure environment.
- Some activities may have local management and local implementation currently
- Some may move to central management and local implementation or central management and central implementation

Incident Response

- Number 1 priority when compromise is suspected
- Involves ITS personnel and
  - Office of Inspector General
  - System administrators for affected systems
  - Network Security – key stroke monitoring
  - Line managers, LaRC CIO, data owners
  - Other contract staff

Intrusion Detection

- Network and Host-based
- Public domain software, local scripts, and Agency provided software
- System administration of all monitoring engines
- NESUS Scanner used for system security planning

Vulnerability Scanning

- Scans can be done on an organizational, building, or case-by-case basis
- Foundstone scanner provided by Agency
  - Includes metrics to the Agency regarding targeted vulnerabilities

Risk Analysis & Assessment

- On request from organizations and projects
- Self-assessment of all SMA systems annually
  - For adequacy & compliance with NPR 2810.1
- Assistance with System Security Planning

Firewalls

- Develop, Operate, Maintain perimeter protection
- Main Center firewall
- Other facility specific firewalls
- Will require close coordination with configuration of border routers to provide adequate perimeter protection for LaRC

ITS Website

- Responsible for accuracy and maintenance
- Pertinent information to maintain
  - User information
  - Sysadmin information
  - ITS services
  - Hot topics
  - Virus info
  - Statutes, Policies, and Guidelines (SOPs)
  - Computer Security Official (CSO) duties/responsibilities
  - Public Key Infrastructure (PKI)
  - IT Security Planning
  - Foreign National Access to Computers at LaRC
  - Certification & Accreditation (NIST 800 Series)

Automating ITS Functions

- Pro-active technology infusion
- New updates to existing technology
  - VPN updates
  - RSA updates
  - Network Access Control
  - Application testing
  - Etc.

Coordinating ITS Activities with other Centers

- Working groups – PKI, RSA, etc.
- Weekly IT Security Managers (ITSM) telecons
- ITS Registry @ computer-security.nasa.gov
- Reporting quarterly metrics
- Weekly Incident Response telecons

Coordinating ITS Activities with other contracts

- There is considerable interaction with other contracts on center
- Interaction and interface with them on issues
- Communication is key
- Build relationships to ensure ultimate goal is IT security of all systems

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Central Web and Database Services

John L. Evans
Office of the CIO

Central Web & Database Servers (CWDS)

- OCIO provided environment for centrally hosting and housing
- System Administration provided by ConITS
- Multi-faceted environment
- Public/Agency/Center impact

CWDS

- Hosting
  - Data and/or application reside on OCIO managed system
  - All maintenance and support is provided
- Housing
  - Environment provided for different organization system
  - Environment only, no maintenance or support

CWDS

- System Administration includes operations and maintenance of system environment
- Upgrades, patching, user accounts, etc.
- System Security Planning
- Capacity planning
- Monitoring and reporting

CWDS

- Environment comprised of
  - Unix (Solaris and Linux)
  - Windows
  - Mac
- Database
  - Oracle
  - MySQL

CWDS

- Public web servers in the DMZ
- Agency applications
- Center applications
- New environment will be based on a zoned architecture
  - Public
  - Extranet
  - Intranet

ConITS II

Business Computing

Connie Basnett
Office of the CFO

Services and Requirements

- Compliance with Operations Level Agreement
  - Center Business Process Lead
  - Business Readiness
  - Reporting
  - Security
  - Training
  - Support Super Users
- Assist in the local deployment of Agency-wide systems and/or upgrades
- Design, develop, and deploy Center systems and/or upgrades
- Develop, maintain, and administer web-sites and dashboards
- Recommend and deploy process improvements
- Develop and maintain user and technical documentation

Services and Requirements (Continued)

- Provide help desk (Tier 2) support for business applications
- Test Agency and Center applications
- Participate in Agency teleconferences, user forums, and status briefings
- Provide project coordination support to the Langley Research Center Office of the Chief Financial Officer
  - Meeting minutes
  - Action items
  - Maintenance of project documentation
  - Meeting materials

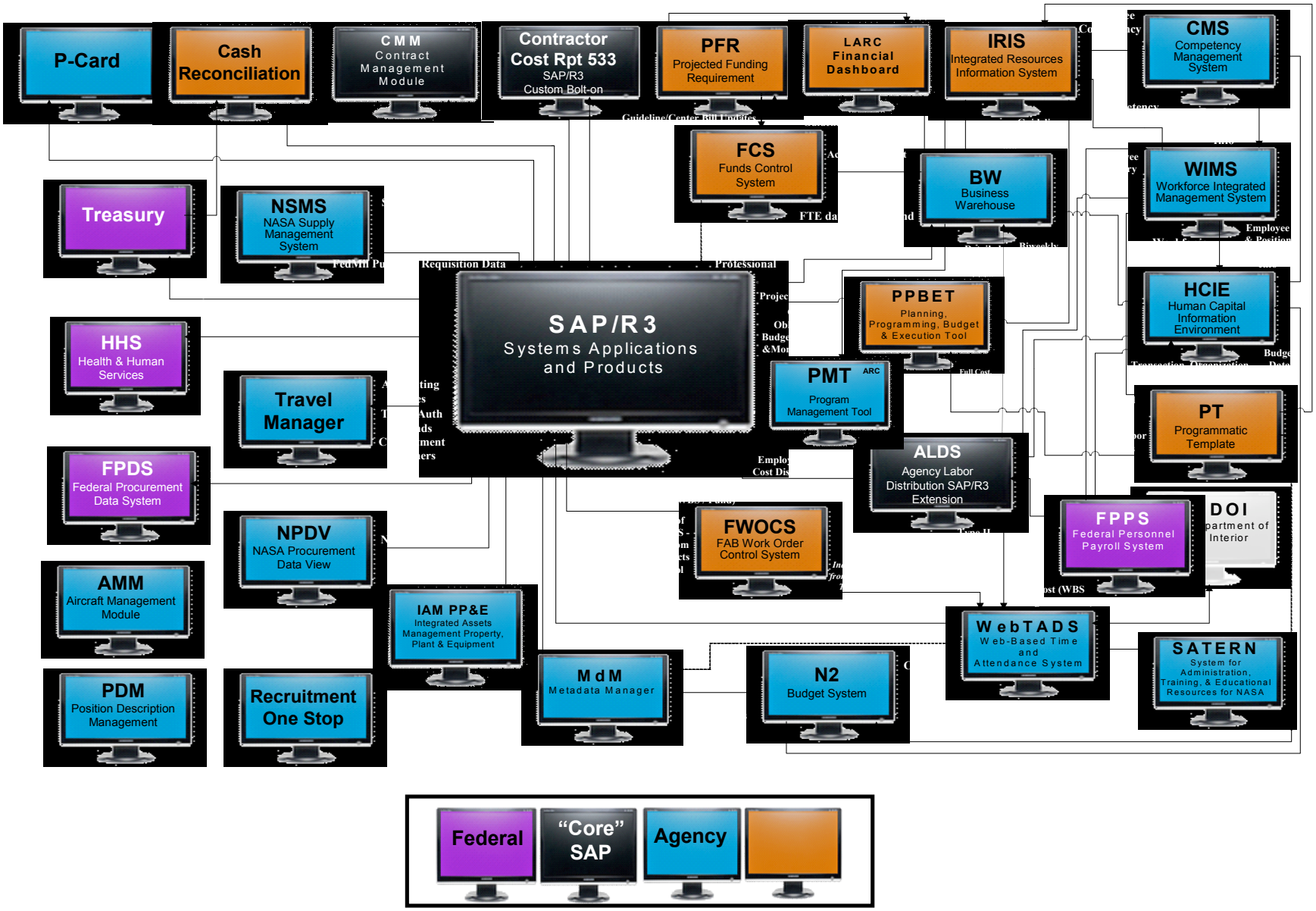
Services and Requirements (Continued)

- Financial systems analysis support to the Office of the Chief Financial Officers' Financial Management and Resource Management offices
  - Extract data and analyze data in Business Warehouse
  - Define reporting metrics for Center performance
  - Identify reports to aid in financial and resource management decisions
  - Assist in reconciling property accounts reported in SAP to NASA legacy systems

Key Customers

- OCFO (Financial Management, Resource Management, Financial Systems Management)
- Langley resource analysts; organizational and project managers
- Integrated Enterprise Management Competency Center

Current Applications



Future Initiatives

- Documentation, maintenance, and enhancements to the business system architecture
- Deployment of governance model for business processes and systems
- Deployment of new or enhanced Agency-wide or Center business computing systems

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Central Storage System (CSS)

N. Duane Melson
Office of the CIO

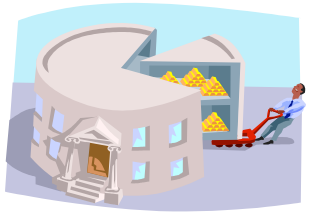
Outline

- CSS Services
- CSS Architecture
- SAN Architecture
- Current Statistics and Graphs
- Near Future Plans
- HPSS – Not a Turnkey Solution
- CSS Support Team Requirements

CSS Services

CSS is a central electronic information storage system at Langley providing services to all Center Mission and Mission Support offices. Functions include:

Backups of IT systems - Copies (locally and off-site) created for the recovery of information stored in Center IT systems



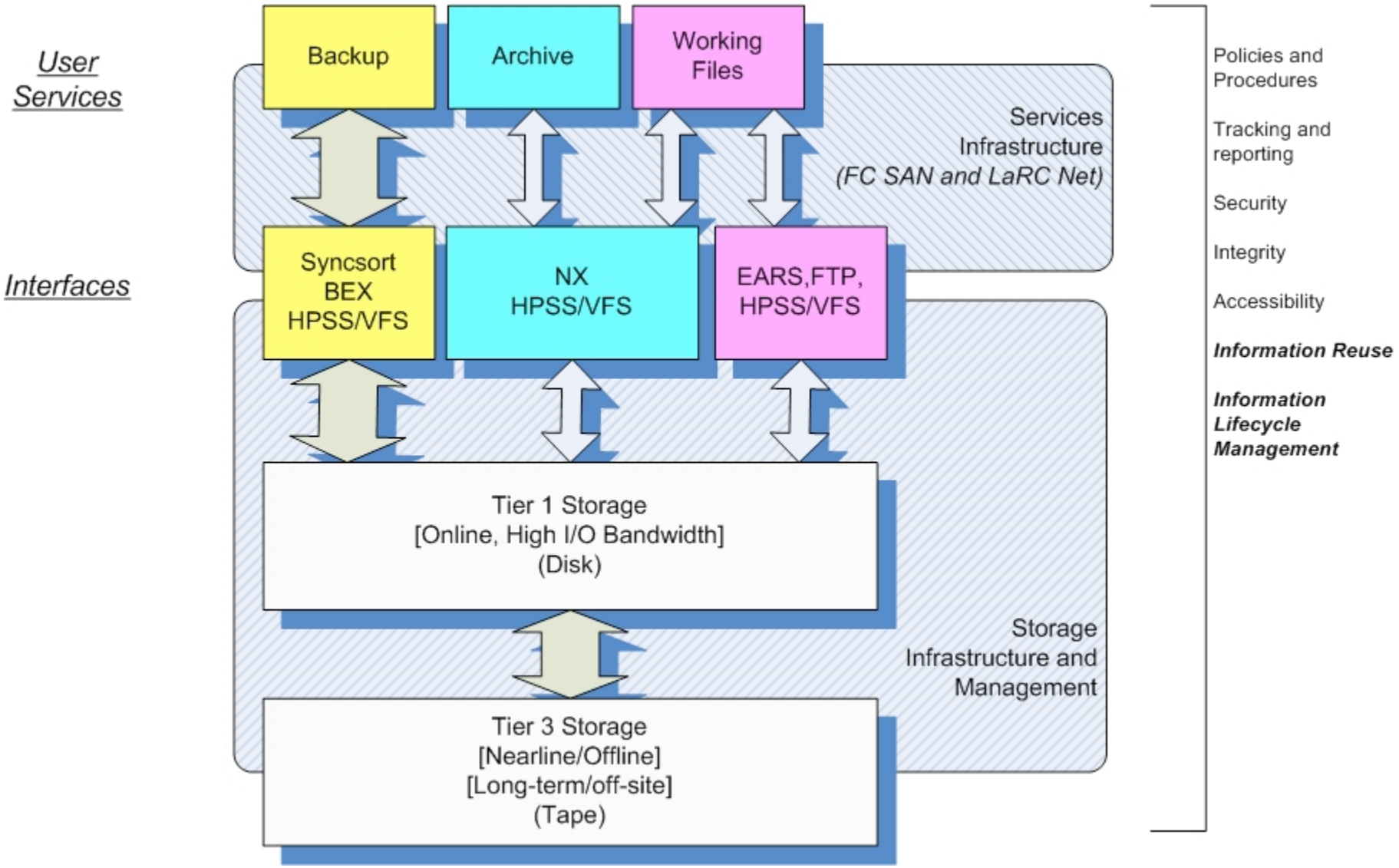
– **Archival** of unpublished program/project information to be retained, often for long periods of time, and accessible for the Center's reuse

Stewardship by a persistent/institutional organization to maintain the information even after the information creator is gone

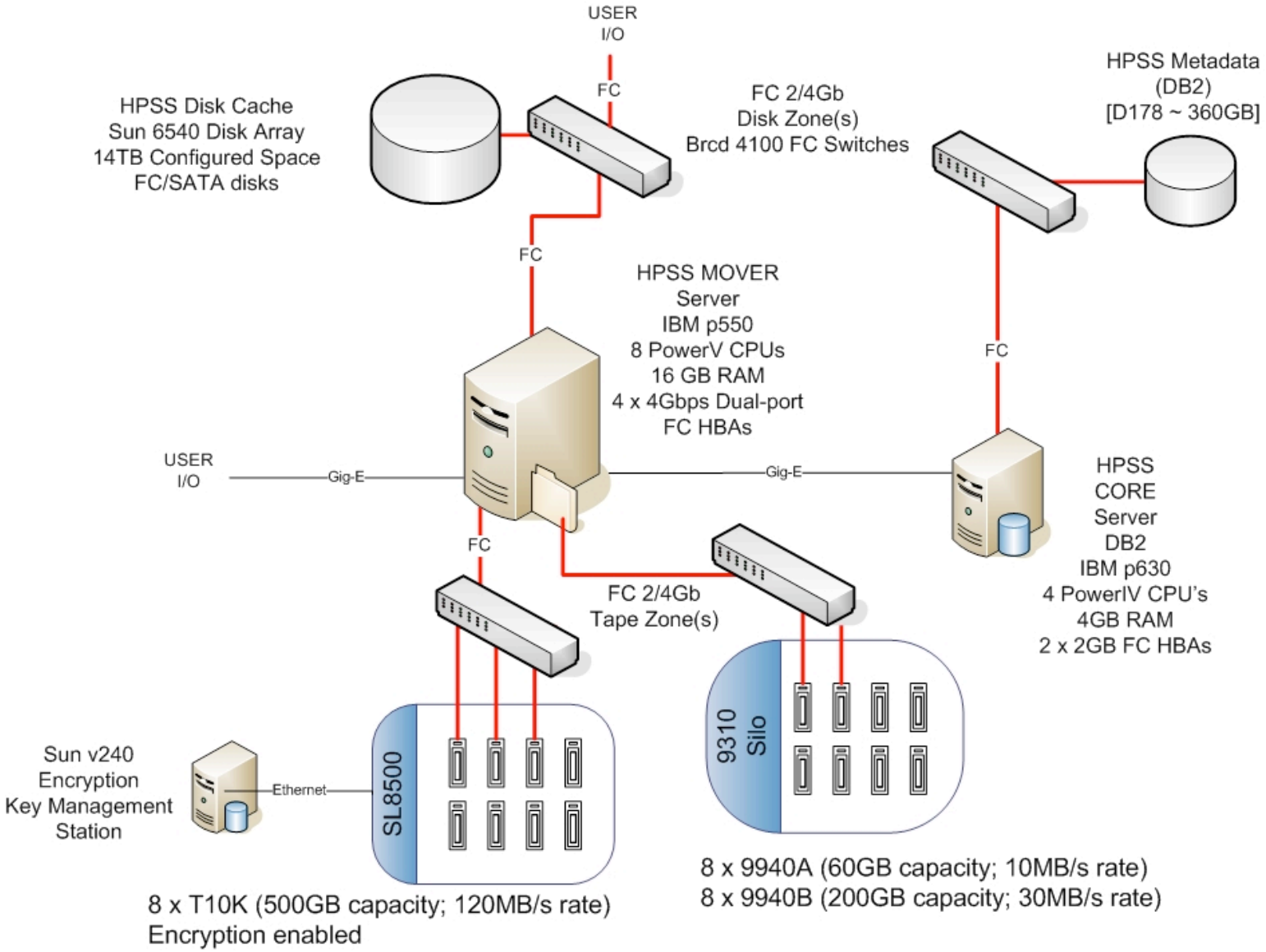
Storage of **Working Files**

- Active information associated with the ongoing collaboration within programs or projects
- Other finite-term data storage supporting distributed, organizational computing systems

CSS Architecture



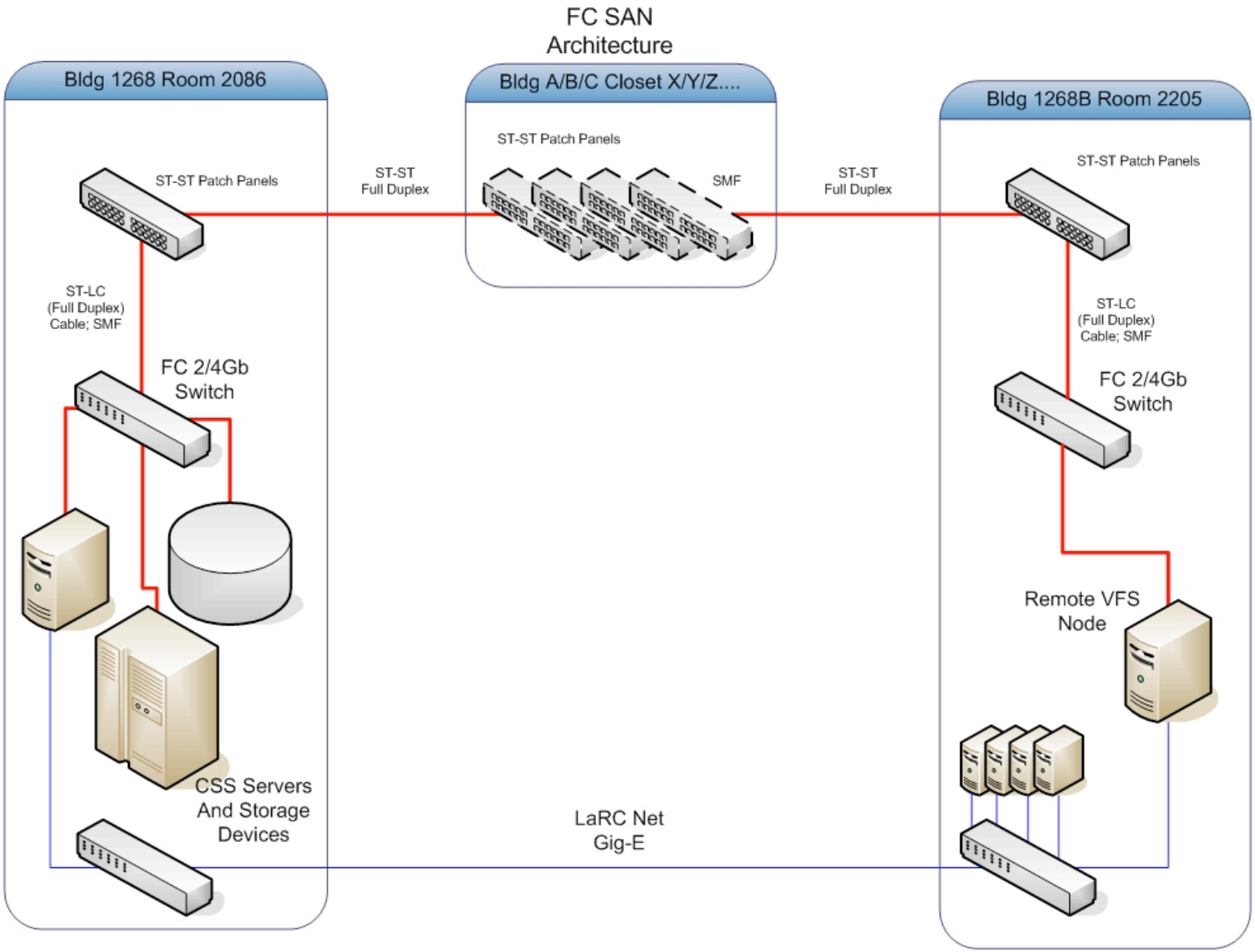
CSS Core System



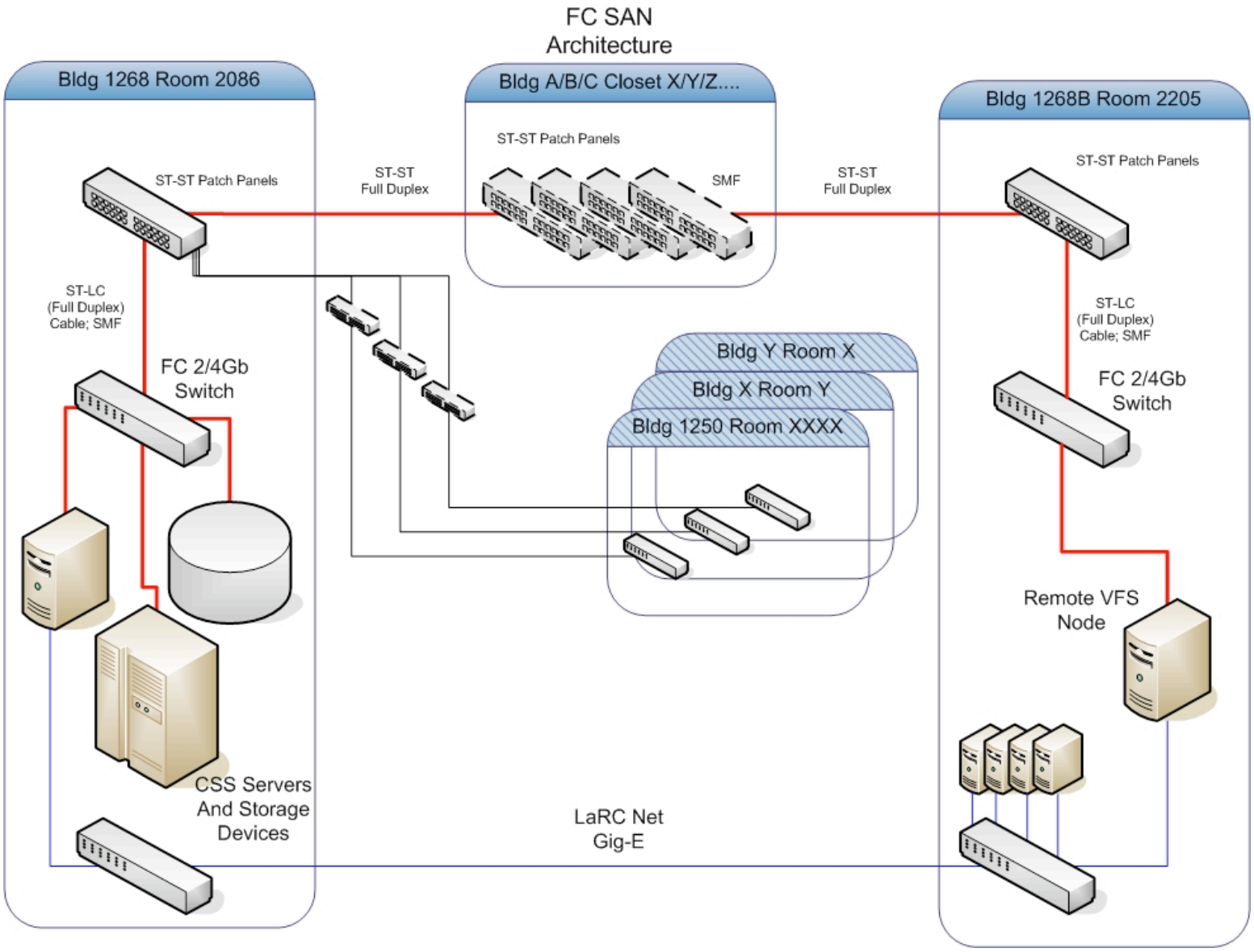
SAN Architecture

- Central FC switch in Bldg 1268, Rm 2086
- Utilize Single-Mode Fiber cabling to patch between Central FC switch and remote FC switches
- Remote nodes are connected to remote FC switch and zoned into the configuration

SAN Architecture (cont'd)



SAN Architecture (cont'd)

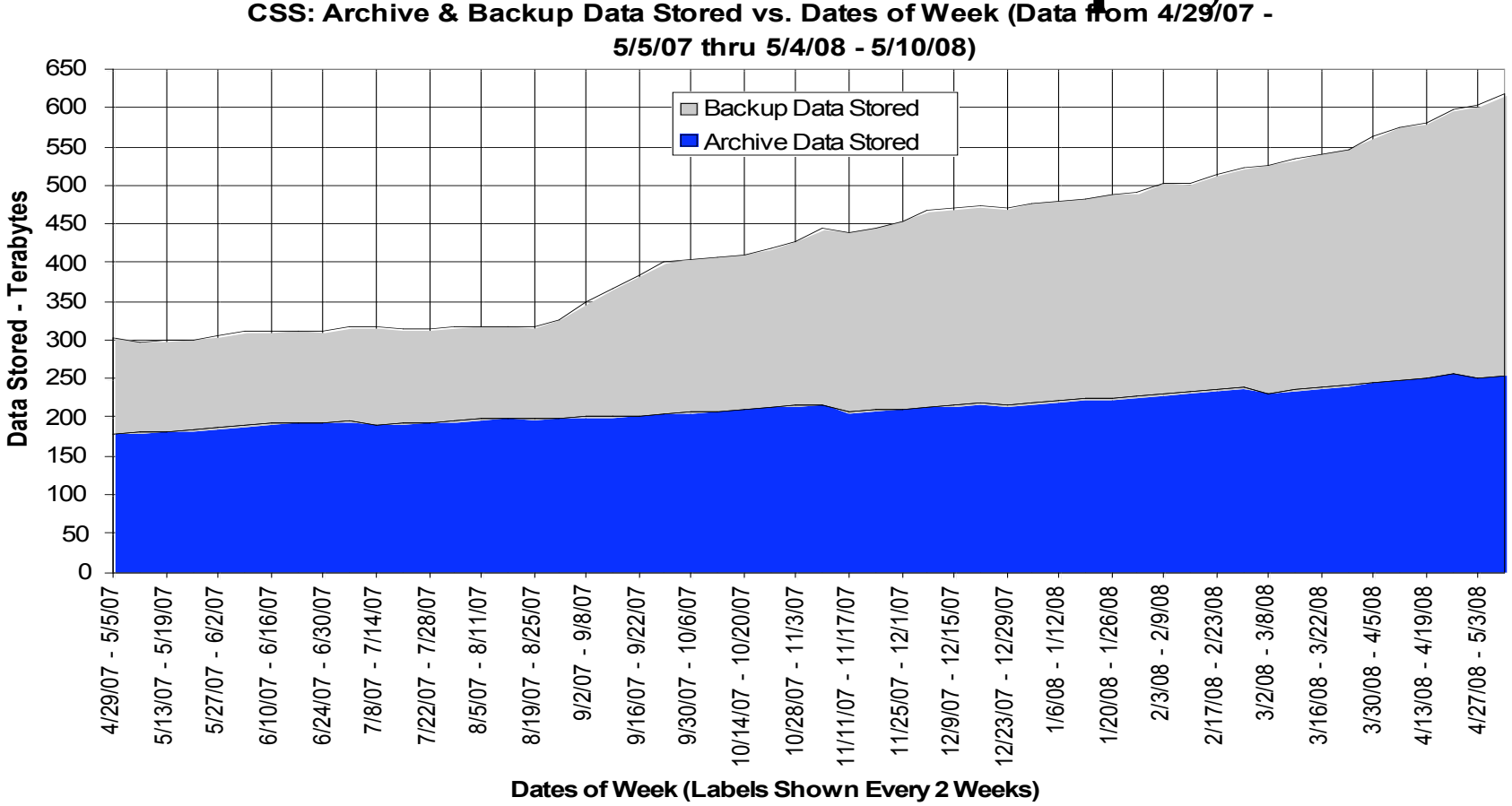


Current Statistics and Graphs

- User, Client, Storage Utilization:
  - 600 Users
  - 500 Client Machines
  - 741 TB of Information and 5 million files

- Daily Traffic
  - 5,000 – 100,000 transfers: 4 – 7 TB
  - Average connection from 250 desktops, back-up servers, file servers, web-servers

Current Statistics and Graphs, Con't



Near Future Plans

- Extend SAN architecture to additional buildings to provide back-up services
- Upgrade Archive application
- Extend SAN to support central mid-range cluster (K) using VFS running on SUSE
- Upgrade tape Drives to T10000B drives to double storage capacity from 1.2 PB to 2.4 PB

HPSS – Not a Turnkey Solution

- Why we choose to use it?
  - HPSS is open software developed by High Performance Computing organizations, primarily DOE
  - Fixed maintenance costs not scaled by storage capacity
  - High performance
  - High scalability
- Support expertise requirement areas:
  - AIX, Solaris, Red Hat Linux, SUSE administration
  - HPSS administration
  - BEX administration
  - Hardware maintenance
  - Fibre Channel and Ethernet
  - Software development in C, Perl, TcłTk

CSS Support Team Requirements

- **Provide 24x7 production operation and 8x5 user interface for access control and user communication**
- **Interface with other IT services** as a user and service provider
- **Develop user application and system tools**
- **Maintain a test system** for testing hardware and software upgrades and running prototype new features
- **Provide and test a disaster recovery plan** and provide necessary services for LaRC to execute it successfully
- **Plan, develop, and execute the integration of a new system** for production use and provide user-transparent transition of data required through media aging and technology refresh
- **Participate in related technical society and user forums activities**
- **Address new requirements with competence** by staying abreast of rapidly changing mass storage technologies

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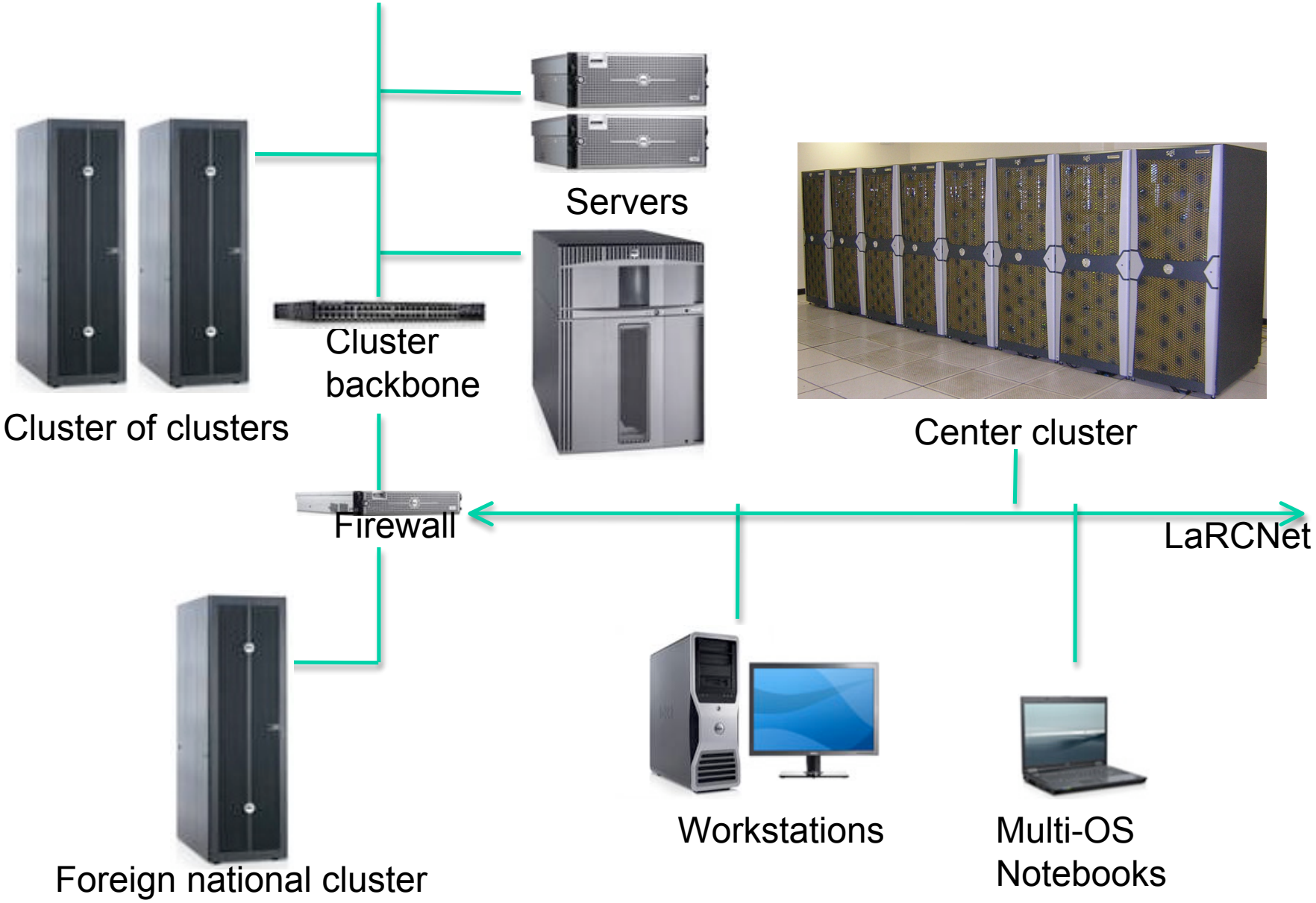
Branch Systems and Cluster Support

Joseph H. Morrison

Computational AeroSciences Branch
(CASB)

System Configuration

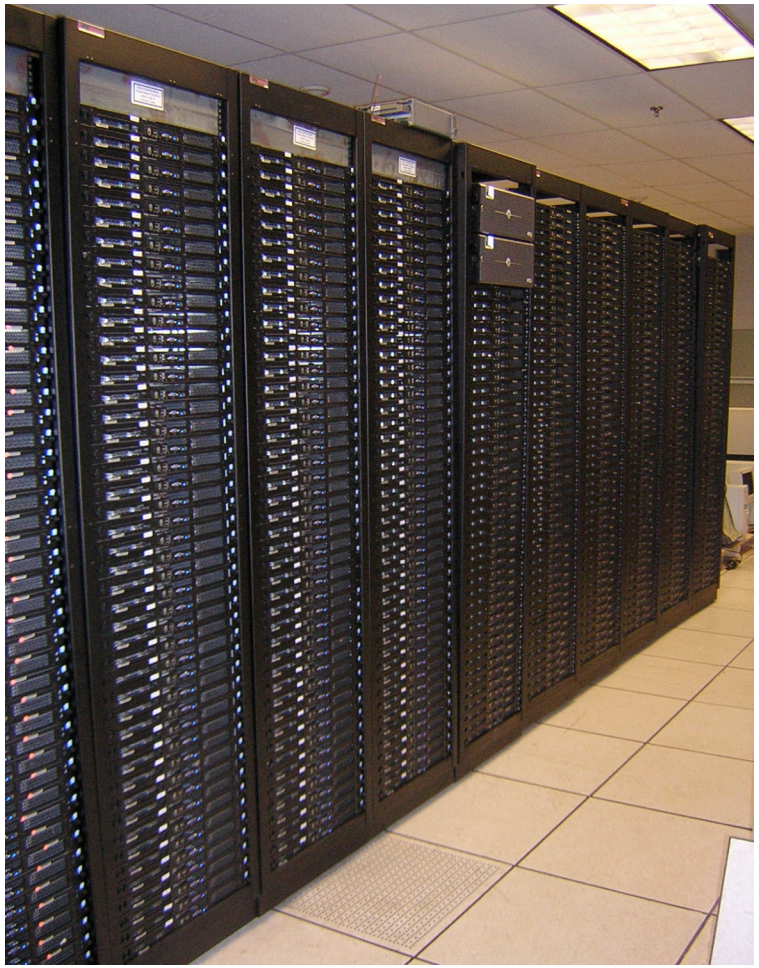


Servers

- File servers
- Boot servers
- Backup servers
- Special purpose compute servers
- Development servers
- Application servers
- UPS on critical servers

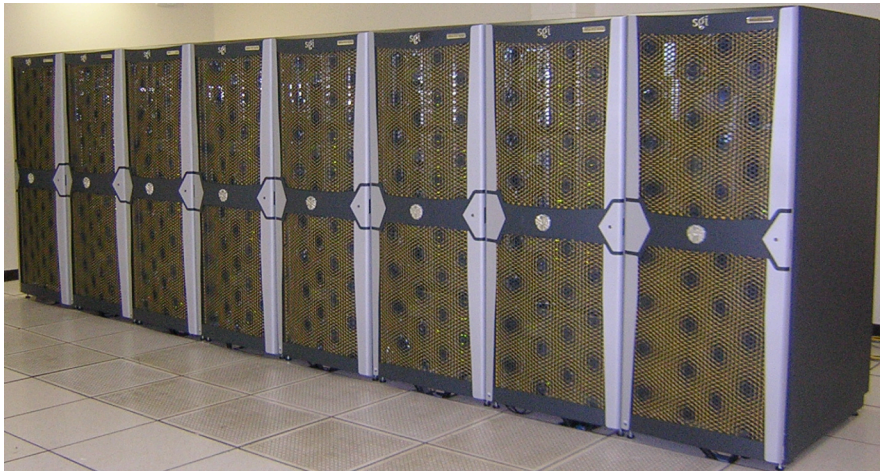
Cluster of Clusters

- Rack mount or boxes-on-shelves
- Commodity hardware
- Compute nodes
  - Single or dual socket
  - 1, 2, or 4 cores per socket
- Interconnection
  - 100 Mb Ethernet
  - Gigabit Ethernet
  - Myrinet
  - 4X DDR InfiniBand
- Diskless or disk configurations
- Netbooted
  - OS may be installed on each node in other branches
- CASB
  - Over 1300 compute nodes with over 1900 compute cores
  - 15 RAID servers with 80 TB storage



Center Cluster

- SGI ICE 8200
- Chilled water cooling
- 384 Compute nodes
  - Dual socket, quad core
  - 3072 compute cores
- 6 servers
  - 2 login servers
  - 1 batch server
  - 2 administrative servers
  - File server
- Interconnection
  - Gigabit Ethernet for management
  - 4X DDR InfiniBand
- SGI management software
- SGI CUBE Network attached storage



System Overview

- Data includes research data and SBU (ITAR/EAR) data
- Clusters, servers, and workstations tightly integrated
  - Shared /usr/local
  - Shared applications
  - File systems shared with Network File System (NFS)
- Custom cluster netboot scripts written and maintained by ConITS for diverse, heterogeneous cluster of clusters
  - Scripts manage setup, maintenance, and monitoring
  - Used by other clusters at LaRC
- Custom firewall scripts written and maintained by ConITS
  - Isolate a Foreign National Cluster from LaRCNet to allow Foreign Nationals to interact with NASA researchers
  - Strictly control access tøfrom specific systems and services
- Backup services provided to file servers, workstations, and laptops
  - 54 tape LTO III library
  - Bakbone software
- Linux update server to facilitate system patch updates
  - Also used by other LaRC groups
- IPMI, Lights out management

Operating System Environment

- Install, maintain, patch, upgrade, maintain security, provide assistance for the following Operating Systems
  - Linux – CentOS, SUSE, RHEL, Fedora, …
  - Solaris
  - Irix
  - Windows
  - Macintosh OS X
  - Multiple OS machines
- Custom Linux kernels required to:
  - Provide netboot capability
  - Support specialized hardware such as Myrinet
  - Optimize system performance for hardware; minimize memory footprint
- High performance journaling file systems to increase performance and data integrity
  - Reiserfs, jfs (IBM), xfs (SGI)
- Software Management
  - Modules
- Job queuing software
  - PBSPro, …

Software Development Environment

- Install, maintain, and provide assistance for development tools
- Requires multiple revisions of these tools be maintained for compatibility
- Compilers – Fortran and C/C++
  - Intel, Portland Group, Lahey-Fujitsu, Absoft, gcc, gfortran, …
- Scripting Support
  - Python, Perl, Ruby, csh, bash, …
- Debuggers
  - Totalview, Intel Debugger (idb), GNU Debugger (gdb, ddd), Valgrind, …
- Libraries
  - MPI (Message Passing Interface)
    - LAM, MPICH, OpenMPI, MPICH2, MVAPICH, …
    - Requires compilation with special network driver support (e.g. Myrinet)
    - Version needed for each compiler
  - OpenMP
  - Intel Math Kernel Library (MKL)
  - Intel Threading Building Blocks (both commercial and open source)
- Optimization
  - Intel Vtune
- Software Version Control
  - CVS, tkCVS, SVN, tkSVN, …

Application Software

- Install, maintain, and provide assistance for commercial and open source applications
- Grid Generation
  - Gridgen, GridEX, …
- Visualization
  - Tecplot, Fieldview, plot3d, gnuplot, mplayer, mencoder, …
- Symbolic Manipulation
  - Mathematica, Maple, Matlab, JMP, …
- Document Preparation
  - Tex, Latex, Lyx, OpenOffice, …
- Custom Software
  - Libraries (Metis, Parmetis, …)
  - NASA Codes (FUN3D, CFL3D, …)

Hardware Support

- Assist in research and planning of new hardware
  - Space, power, cooling requirements; performance; support
- Install new hardware
  - Assist in delivery; install hardware in racks; cable; install and provision OS, applications, and queuing software
- Maintain systems
  - Identify performance problems and formulate solutions
  - Monitor for failed systems; confirm failures with vendor supplied or other diagnostics tools; notify vendor; install replacement components/coordinate vendor replacement; assist in returning failed components to vendor
  - Develop method to economically maintain old hardware
- Upgrade
  - Assist in identifying bottlenecks and solutions
  - Perform upgrades to hardware that NASA acquires (additional memory, disk drives, accelerators, GPUs, …)
- Excess
  - Assist in excessing old or failed systems that are not economically feasible to repair

New Technology Support

- Assist in researching, planning, and adopting new technologies
- High Performance File systems
  - Lustre, GPFS, Panasas, …
- Processors
  - AMD, Intel, IBM, …
- Accelerators
  - FPGAs, GPGPUs, Cell, ASICs, …
- Interconnection
  - 10 Gb Ethernet, 4X QDR InfiniBand, …
- Higher density
  - Cooling, weight limits, …
- New management hardware or software
  - Investigate and evaluate software packages which can improve cluster setup, management and monitoring (e.g. ROCKS+)
  - Enhance lights out management support via hardware/software solutions

ConITS II

AEEB Modeling and Simulation Support

Patricia A. Kerr

Systems Engineering Directorate

AEEB Laboratories

- Integrated Design Center (IDC)
- Geometry Modeling & Grid Generation (GEOLAB)
- Data Analysis and Visualization (DVAL)

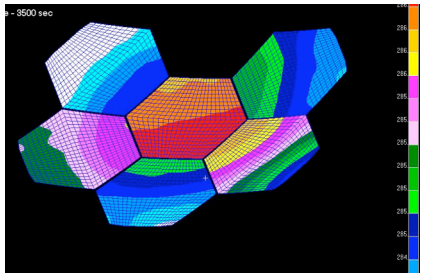
Integrated Design Center

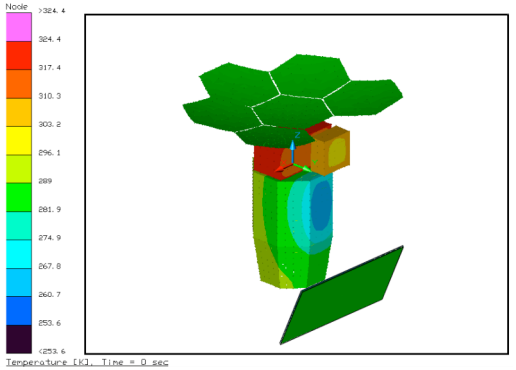
Purpose:

- Collaborative engineering facility with sophisticated tools and collaborative process for projects in all phases of design, from concept to flight. Design team in one place for real-time design development in an integrated environment using standard tools they already know.
- Risk reduction by more complete exploration of design space

Objectives:

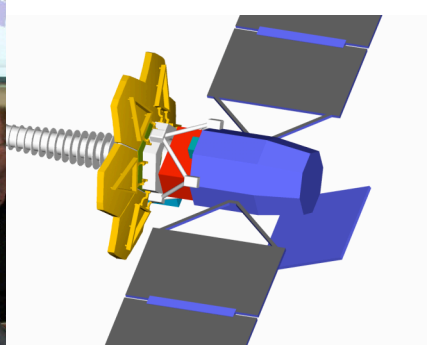
- Work with one representation of geometry and design
- Facilitate transition from proposal team to development team
- Capitalize on synergisms between disciplines
- Encourage system thinking related to requirement & design change in terms of cost, schedule, mass, power, risk, safety, and performance in real time.



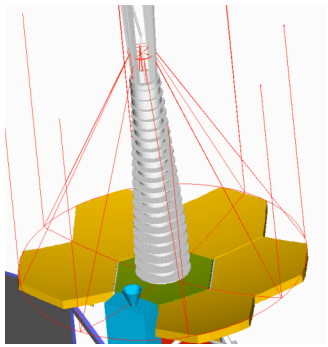


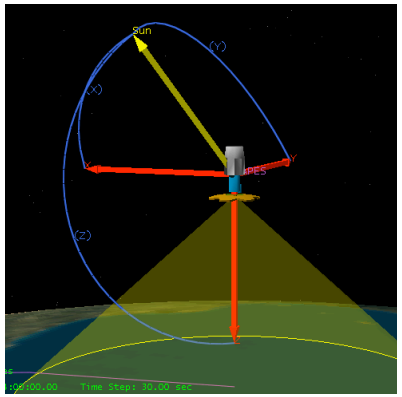
Thermal

Mechanical



Optical





Orbital

Integrated Design Center Support

Facility is located in B1209, RM180
http://idc.larc.nasa.gov

System Administration

•12 high-end PC workstations networked together

- •Audio visual equipment to allow simultaneous wall-projection of 6 PCs to individual screens
- •Network access and file sharing via server

Application Management

• Collaborative tools for project and risk management

•3D physics-based tools for mechanical and electrical design, structural, thermal, optical, orbital and telecom analysis, power systems, systems engineering, etc.

•Electronic interfaces between tools to directly mesh inputs and outputs between relevant disciplines and **allows comprehensive multi-disciplinary analysis**

IDC Software Inventory

IDC Station	Software Tools
Software	MS Visio
	MS Visual Studio
Structural	PATRAN, Materials Selector
	NASTRAN
	SigFit
Mech/CAD	Pro/E
Payload/Optics	STK
	ZeMAX
	TracePRO
Avionics/Electronics	MatLab
	MS Visio
Orbital/Environmental	STK
	PolyTrans
Telecom	Multi Mission Telecom Analysis Tool – MMTAT
	MatLab
	STK
	SPASIM

IDC Station (con't)	Software Tools
Thermal	PATRAN, PATRAN Thermal
	Thermal Desktop / AutoCAD
	Fortran, C++
Fabrication/ Testing	Pro/E
	Unigraphics
Mission/System	IceMaker (automated linking of Excel data and files)
	SEE
	SMALLSAT
Power	OrCAD via Windows 2000 terminal emulator
	Multi Mission Power Analysis Tool -- MMPAT
All	Remote Admin, IceMaker, ODIN standard load (Word, Excel, PowerPoint, FTP, Eudora, Netscape, NetMeeting, Meeting Maker etc)

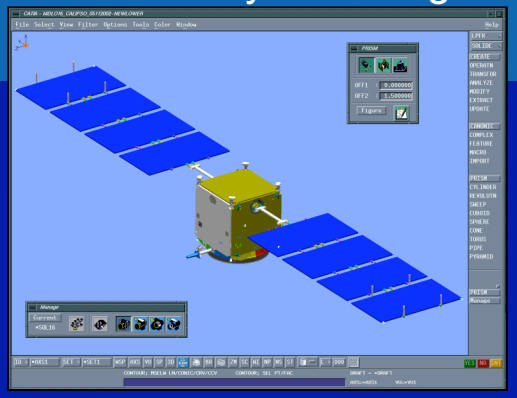
Geometry Laboratory (GEOLAB)

Purpose: To provide expertise in the construction and use of numerical geometries and grids for computational engineering analysis in support of NASA programs and projects.

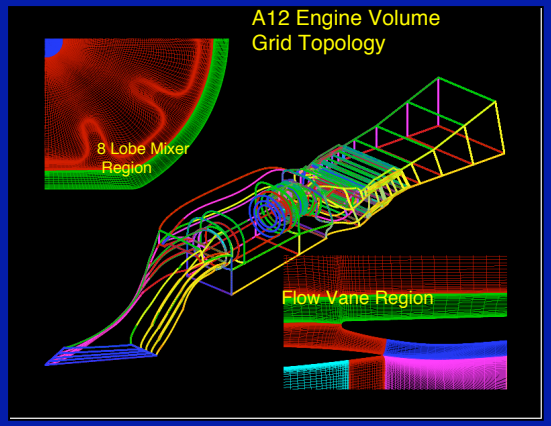
Capabilities:

- Geometry modeling and comparison
- Grid generation for CAE applications
- Reverse engineering to capture “as-built” geometry
- Integrate geometry and grids within analysis and design processes
- Data exchange: mitigation of CAD data conversions and differences in modeling techniques

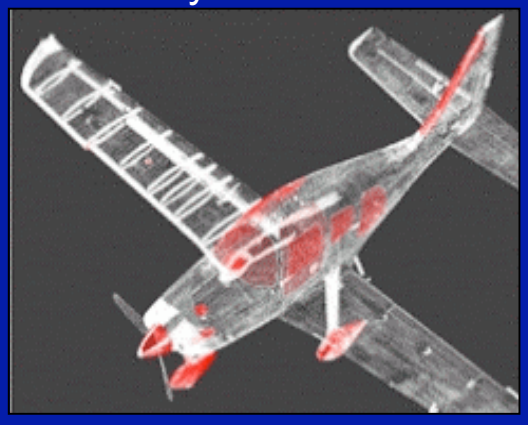
Geometry Modeling



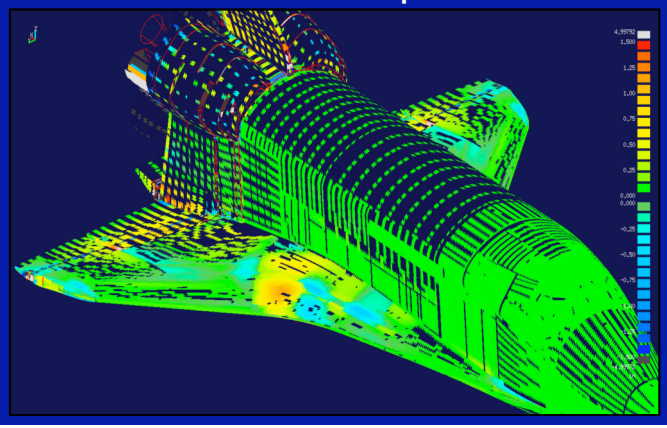
Grid Generation



Geometry Reconstruction



Geometric Comparison



URL:geolab.larc.nasa.gov

GEOLAB

- **Facility**
  - Located in B1268, RM1051
  - 10 PC & Mac high end workstations
  - 17 node Beowulf cluster
  - Central file servers and 6 TB data storage library
- **Task Load**
  - Short duration projects – on the order of days to a few weeks
  - Historically, 30-40 projects/yr producing 60-80 geometry and grid products

GEOLAB Production Software Inventory

- **Commercial Software**

Pro/Engineer, Unigraphics, IDEAS, CATIA 4 and 5	(high end)
ICEMDDN, SolidWorks, Patran	(mid range)
Surfacer, Geomagic	(reconstruction)
CADfix	(repair)
ICEMCFD, Gridgen	(grids)

- **NASA Sponsored Software**

GridTool, VGRID, GridEX	(unstructured)
Volume2K, TOG, CSCMDO, REGI	(structured)
Alchemize	(data exchange)

Typical Geometry Challenges

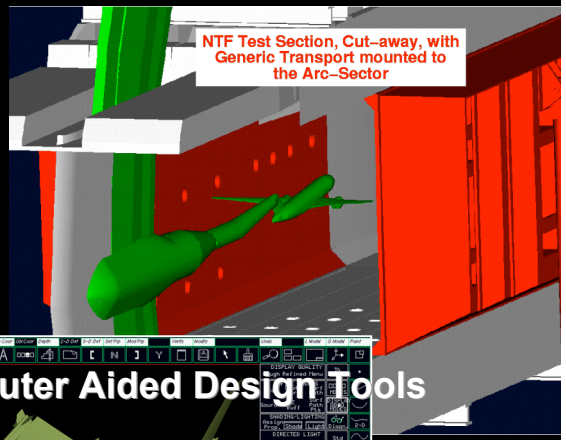
Teams disbursed geographically – multiple centers & industry partners

Data exchange issues due to multiple CAD systems and data formats in use

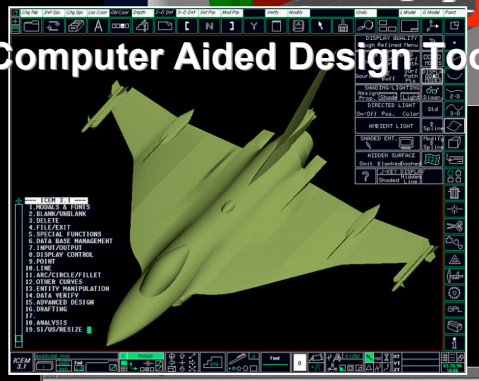
Disparate data requirements – CFD, CSM, visualization, simulation, manufacturing, etc.

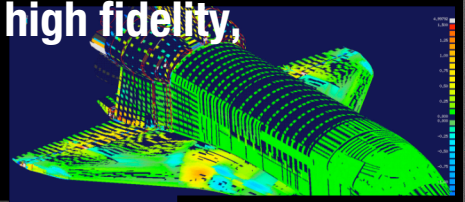
Establishing data pedigree, ie. data origin, quality, & content

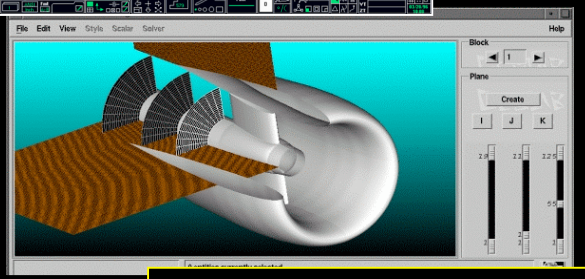
Model complexity – large assemblies, high fidelity, topology simplification

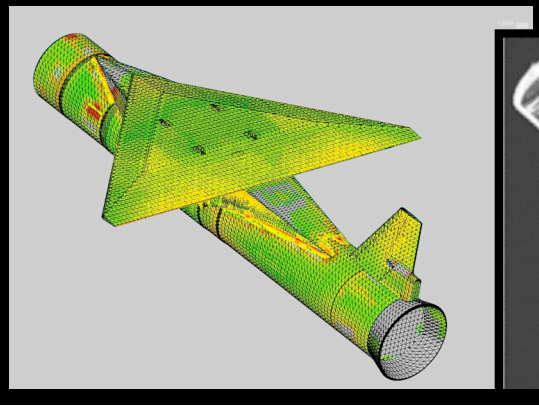


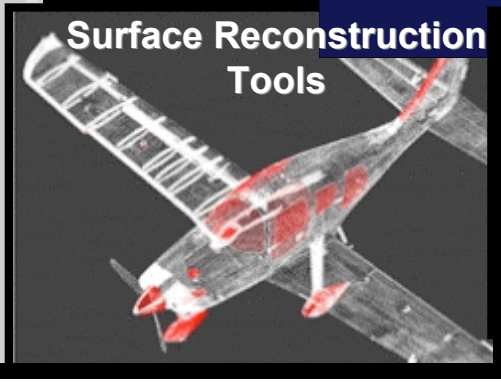
Computer Aided Design Tools



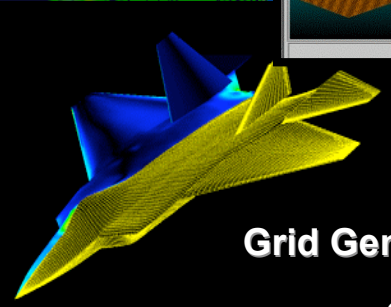






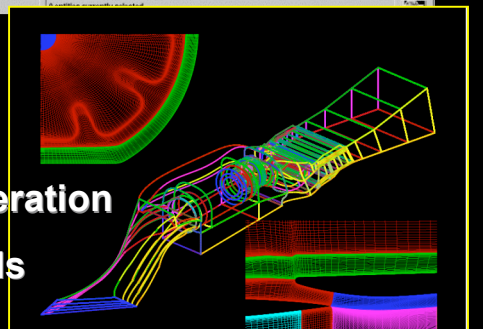


Surface Reconstruction Tools



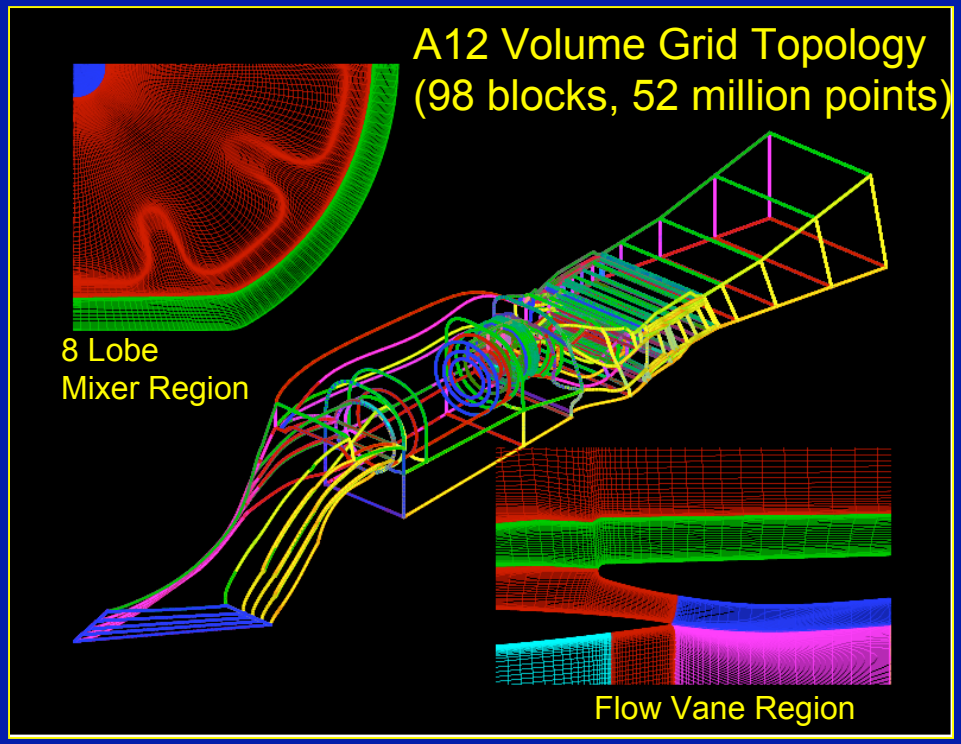
Grid Generation

ols

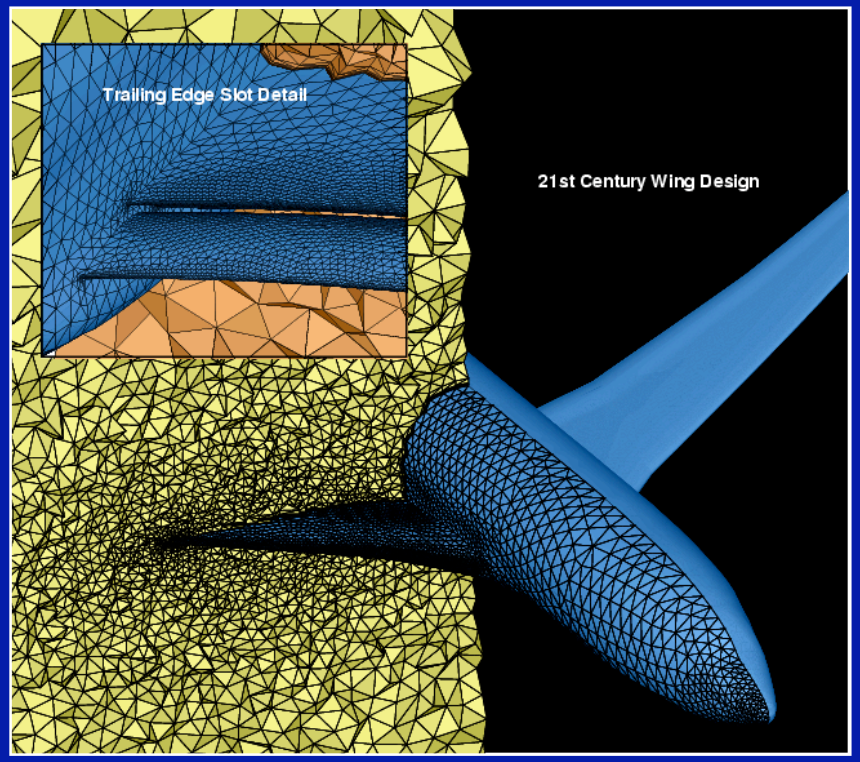


Grid Generation & Modification

Multi-Block Structured



Unstructured

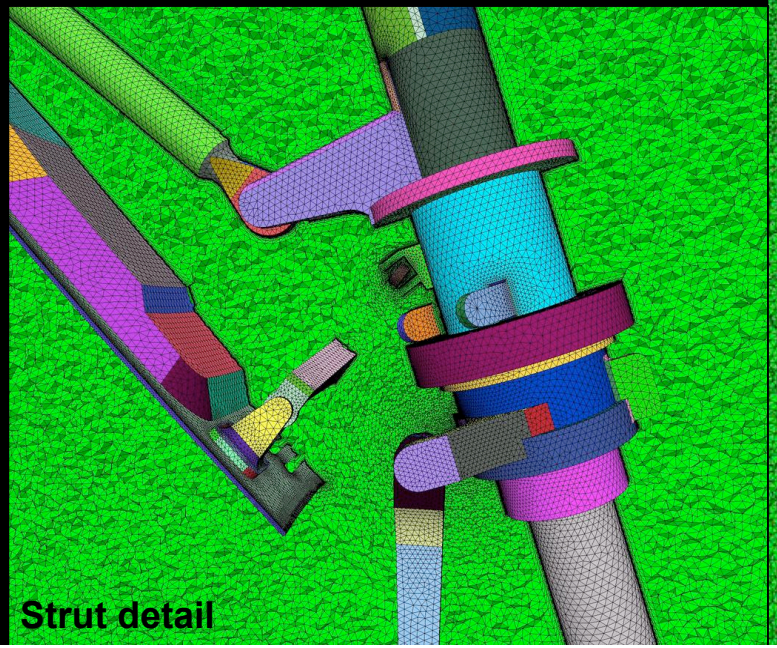


Airframe Noise Reduction – Geometry and Grid Generation Support

Gulfstream G5 Landing Gear Assembly

Geometry simplified to facilitate gridding and analysis. High grid density required to support acoustic analysis.

Unstructured grid contains ~140 million tetrahedra.

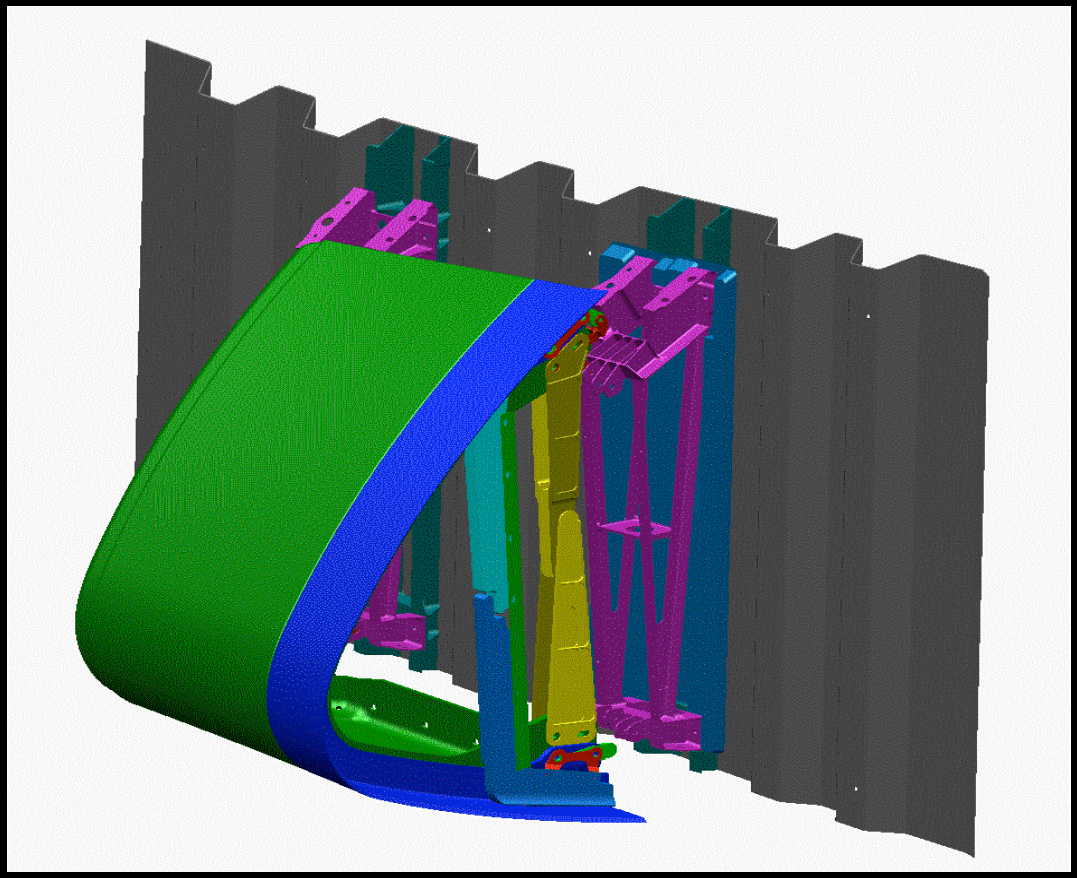


Strut detail

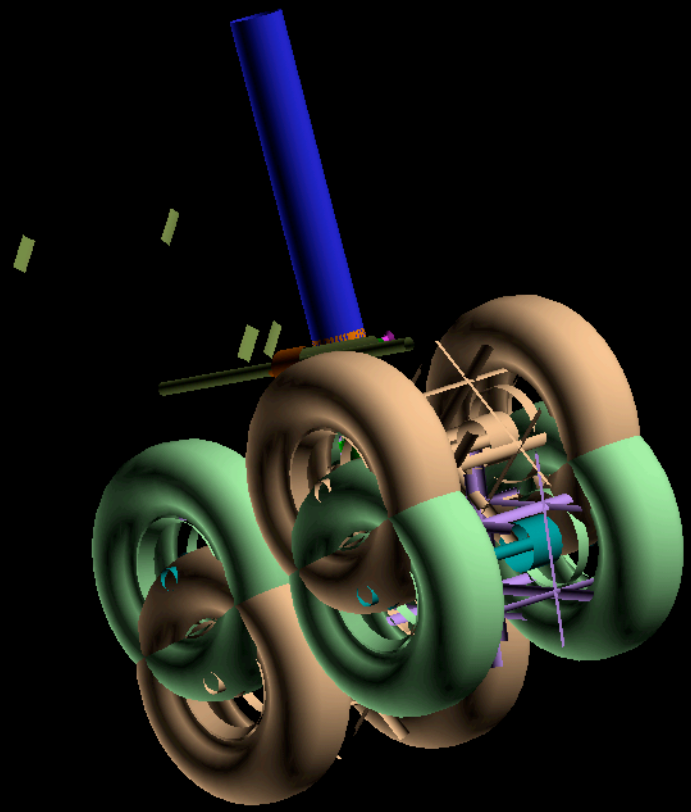
CAD Data Translation

Shuttle Return-To-Flight Wind Tunnel Model

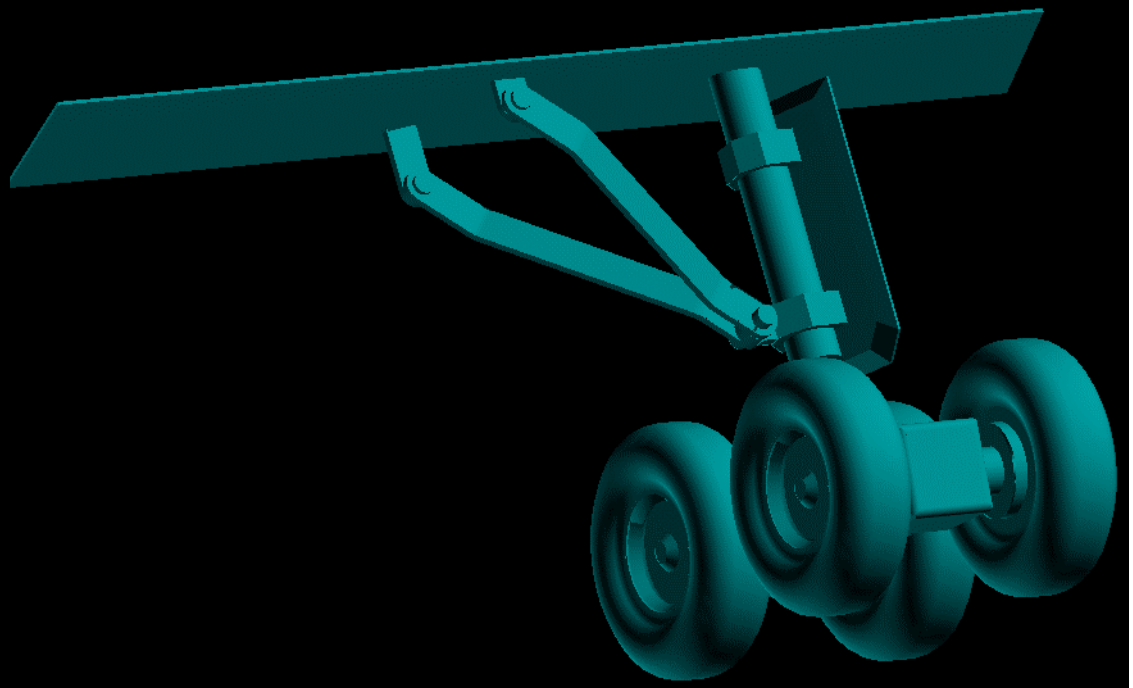
RCC Panel 6 and Mounting Hardware Geometry translated from CATIA V4 into Pro/Engineer for model fabrication



Landing Gear Data Extracted for Analysis



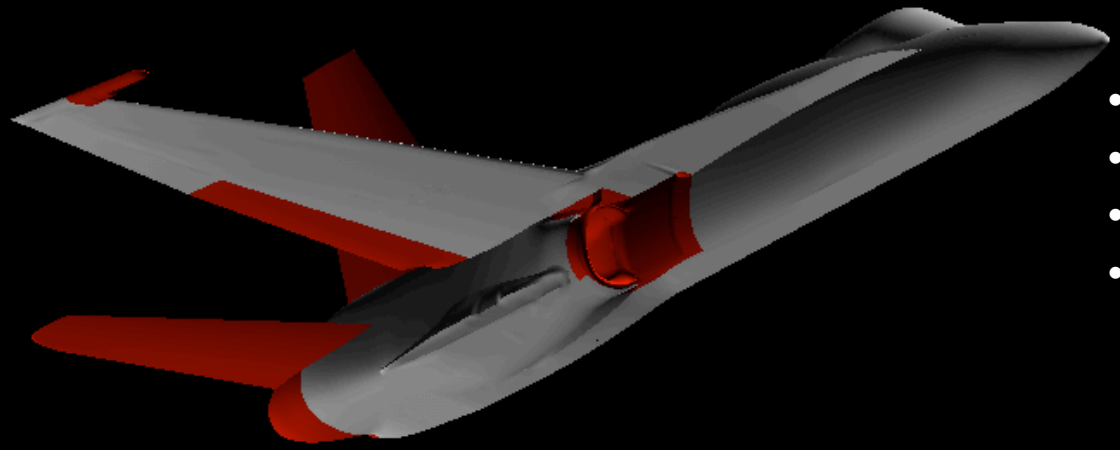
Data as received



Data after processing

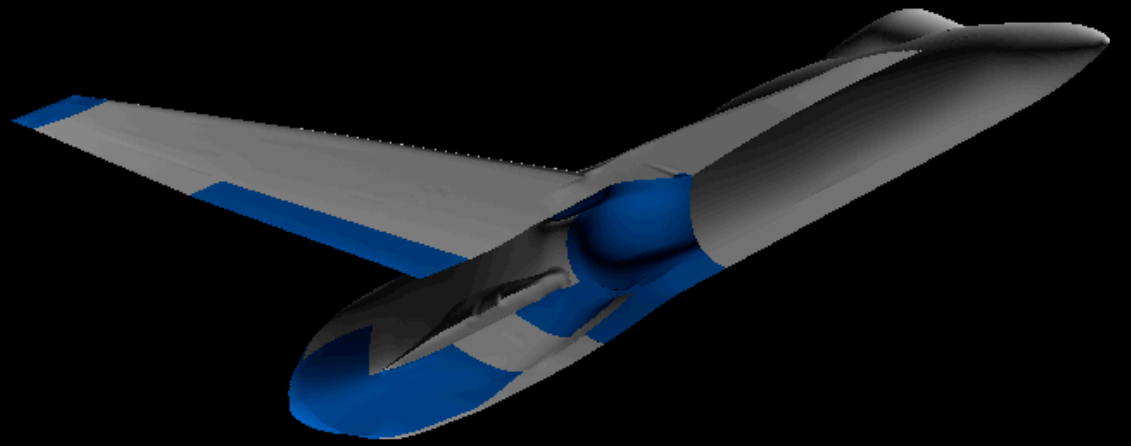
- Rotated geometry removed
- Bracket geometry rebuilt to match test article
- Axle blocks completed as solid entities

Geometry Changes to Facilitate Analysis



Original F18aaw

- Remove tail surfaces & missile
- Cover notch in trailing edge
- Cover inlet/diverter geometry
- Simplify & cap engine nozzle

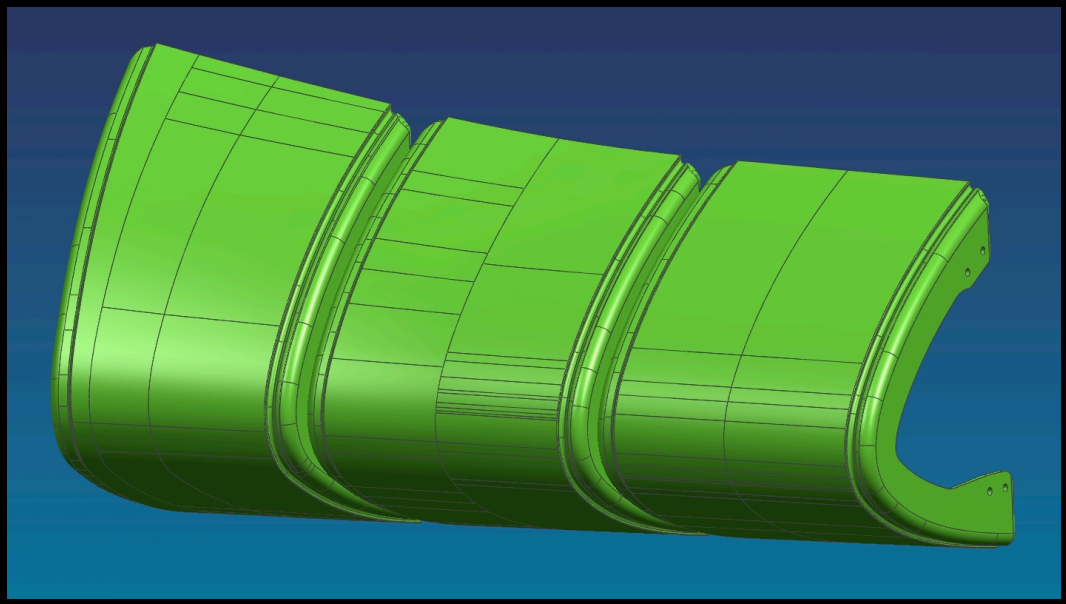


Simplified F18aaw

Shuttle Return-To-Flight – RCC Panels

Certified Boeing Geometry of
RCC Leading Edge Panels 8, 9, 10

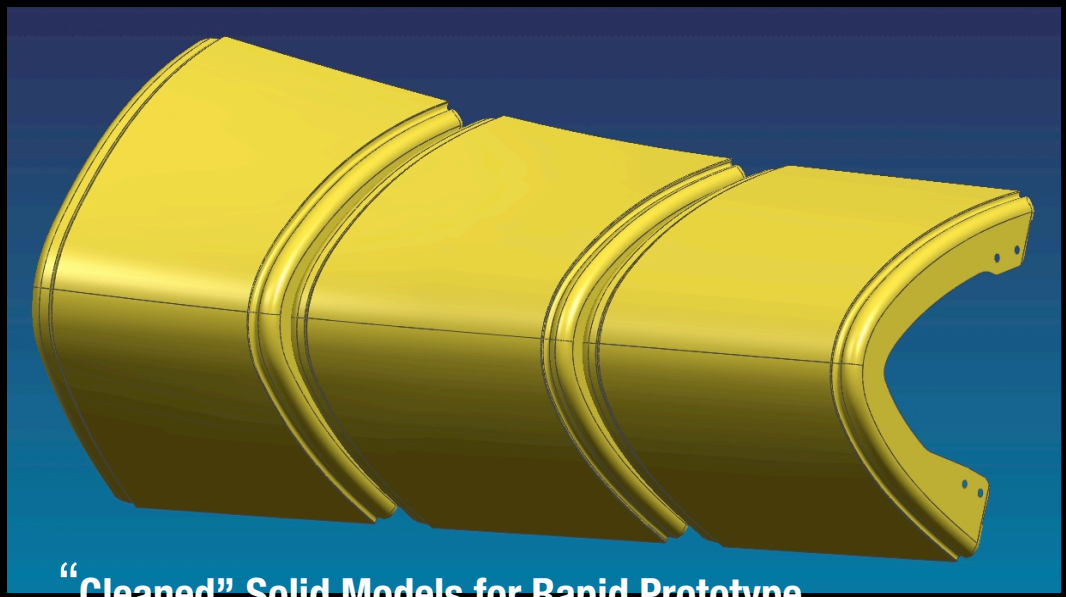
~100 surfaces for panel OML ONLY



Simplified Geometry of RCC
Leading Edge Panels 8, 9, 10

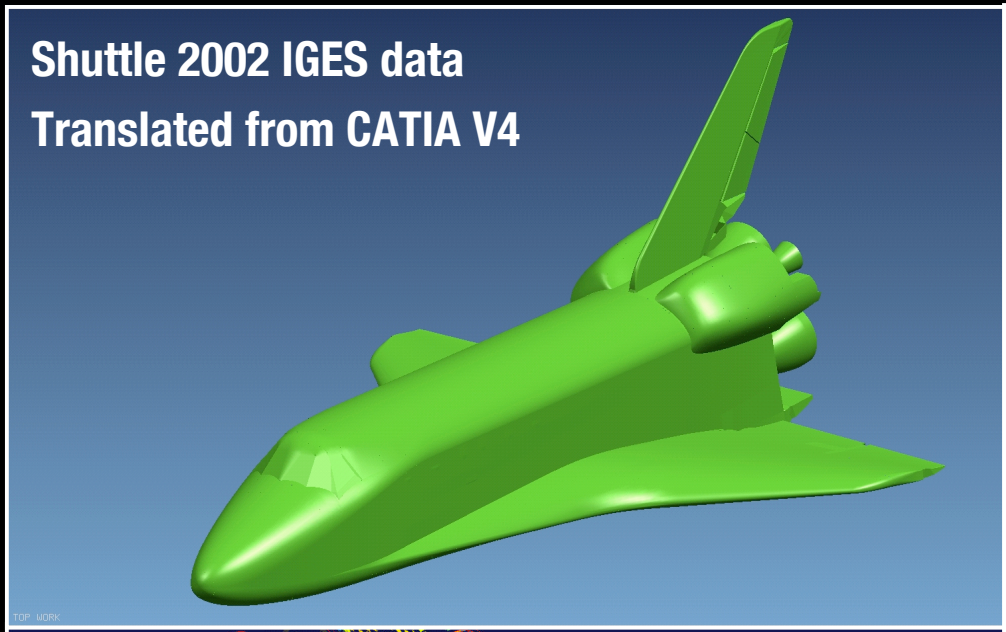
2 surfaces per panel OML

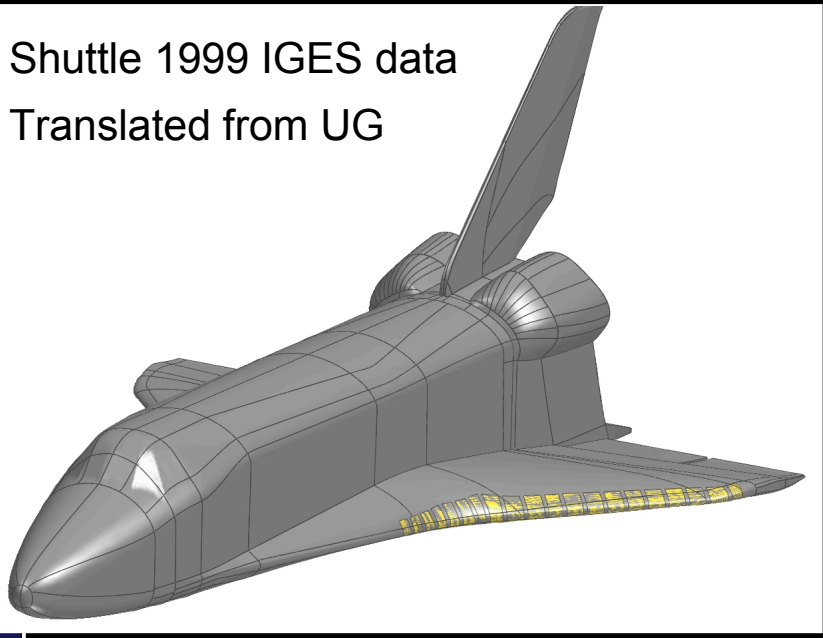
Within .001” of Certified Data

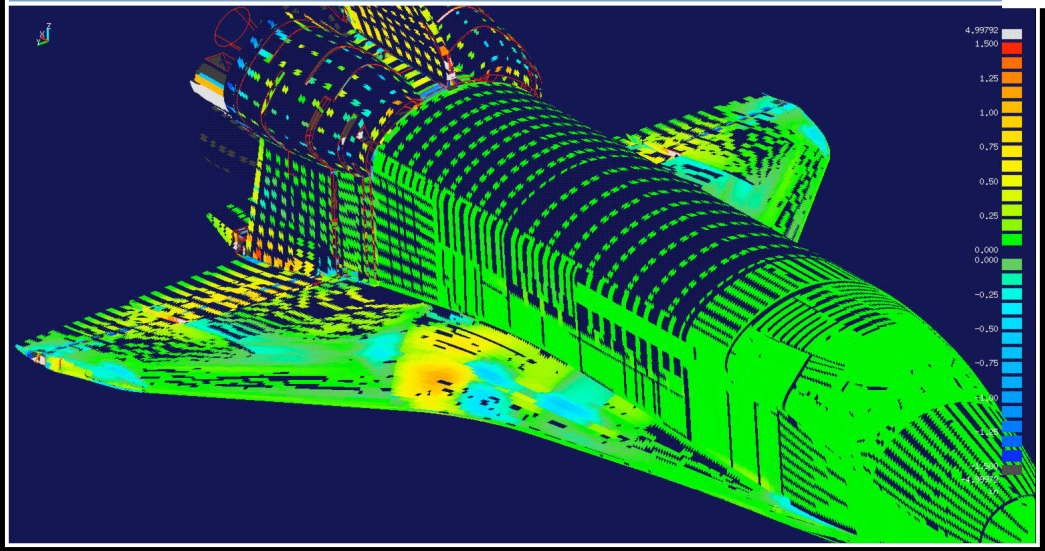


“Cleaned” Solid Models for Rapid Prototype
Wind Tunnel Models and CAE analysis

Columbia Accident Geometry Data Recovery



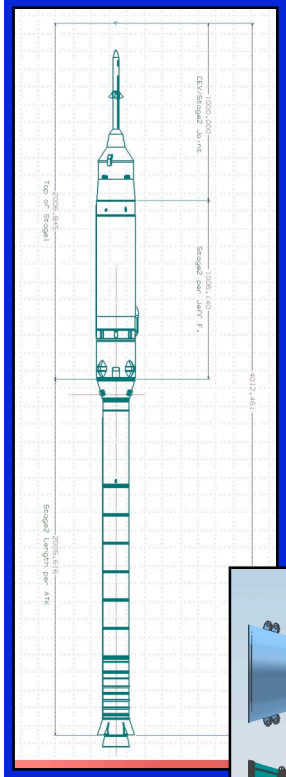


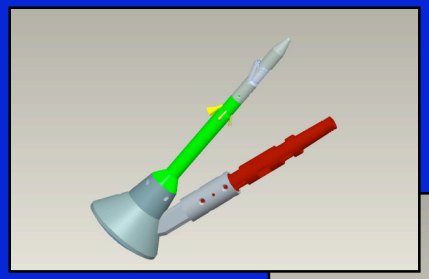


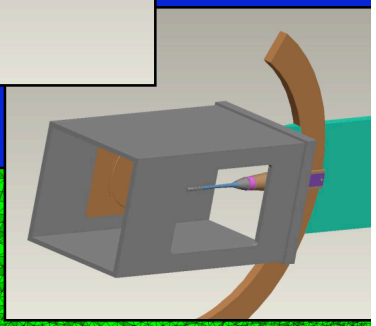
Comparison of Shuttle 2002 to Shuttle1999 geometry found differences on upper wing surfaces, oms pods, and rocket motors.

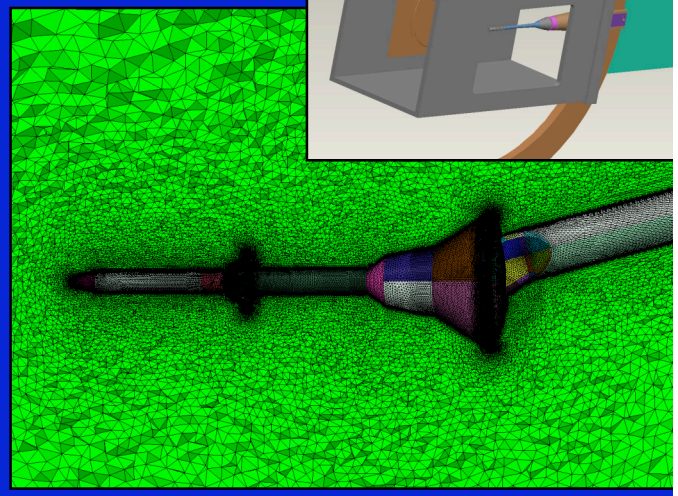
Geolab Support Tasks for ARES

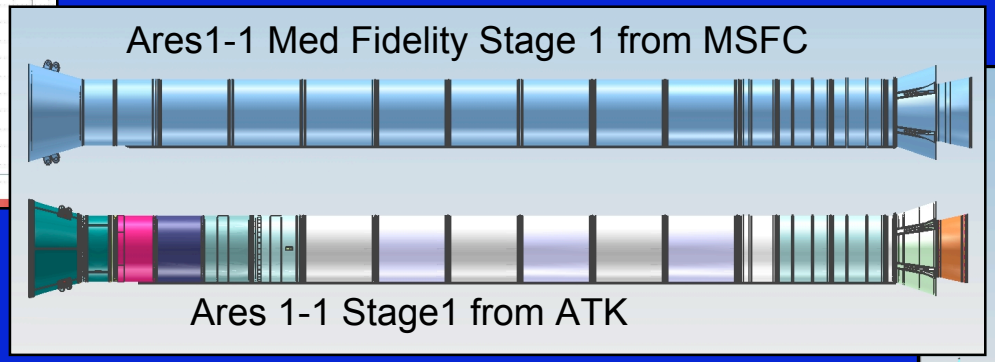
- Geometry OML/EDF baseline drawings
- Geometry comparisons
- Instrumentation reduction images
- Geometry modeling & unstructured grids for analysis supporting aero database and aeroelasticity loads calculations
  - ALAS/605 capsule with covers and stings
  - MLAS covers
  - Ares I
  - Ares I-X

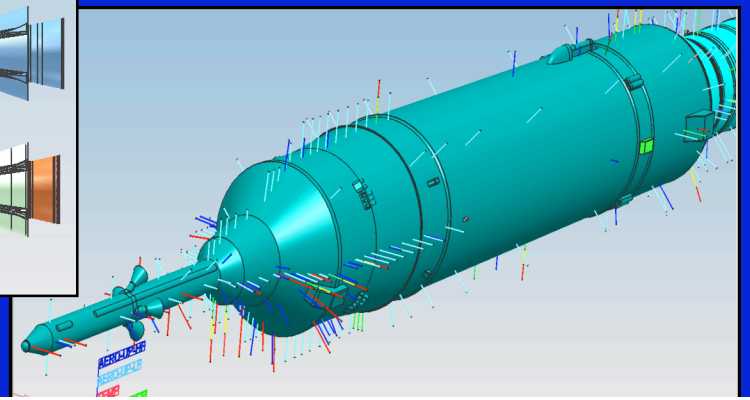








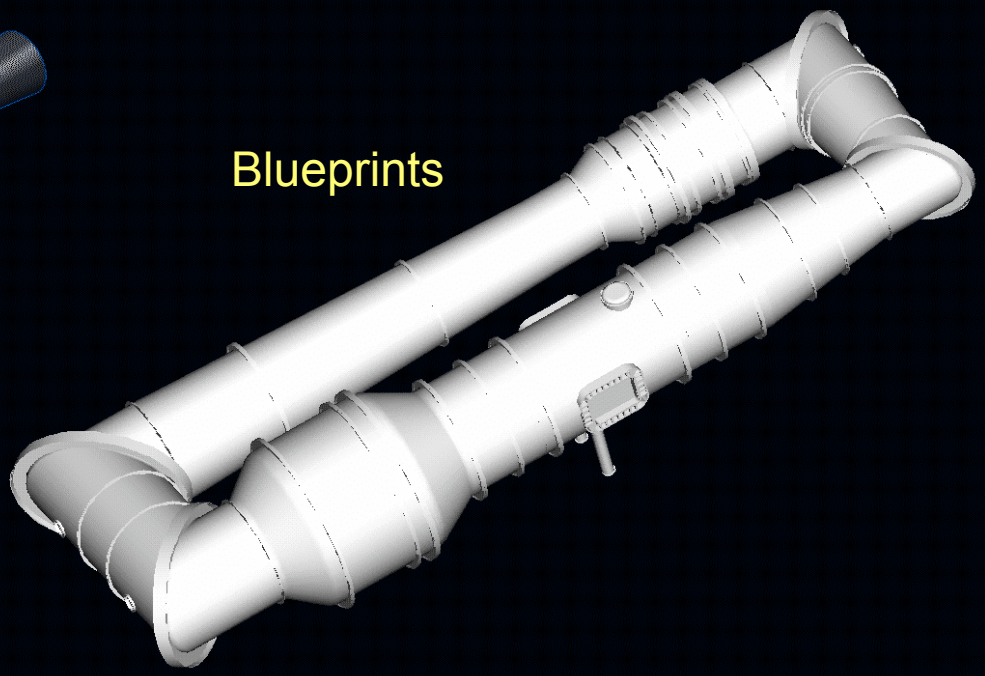




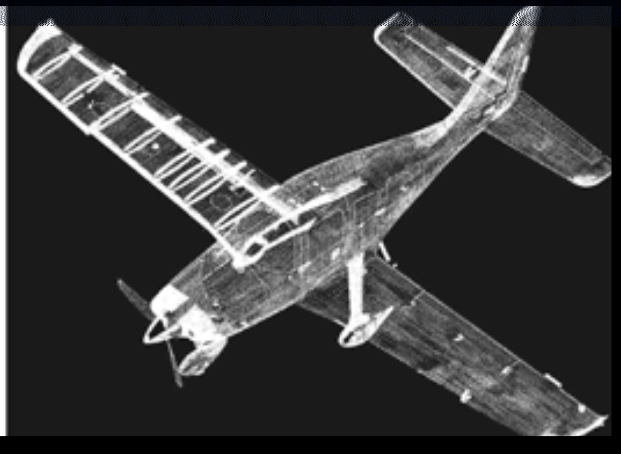
Geometry Reconstruction

Tabulated Data &
Analytic Data

Blueprints



Digital Measurements



Geometry Reconstruction

Technology Objective

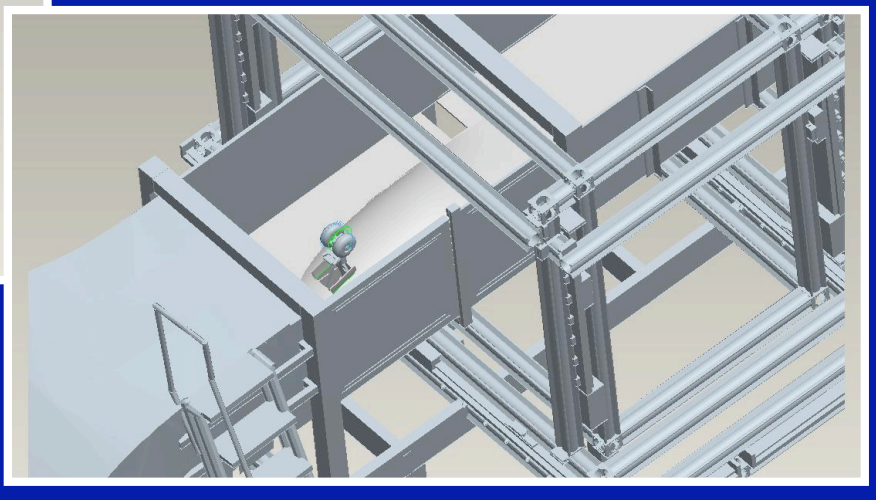
- Reverse engineer CAD geometry using photographs and design specifications obtained thru web sites for Boeing 777 nose landing gear.

Application of Technology

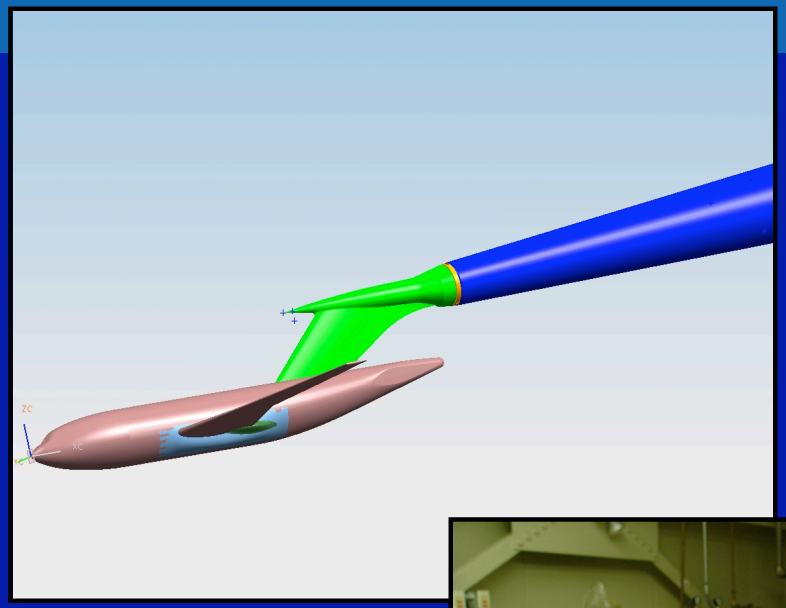
- Utilization of the Style module in the Pro/Engineer CAD software to extract 3D design data from Boeing reference photographs.

Significant Accomplishments

- Created 11% CAD model to support CFD analysis, model fabrication, and experiment design in BART and QFF tunnels for follow-on research.

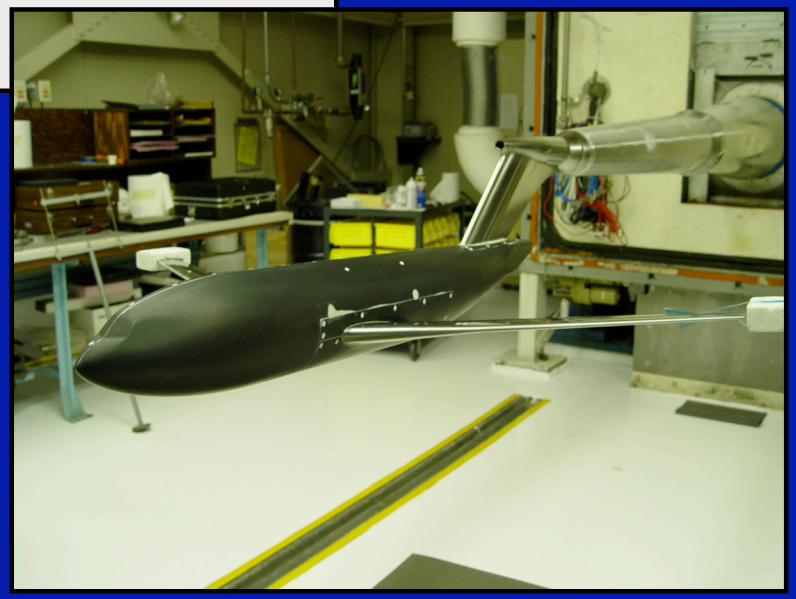


Drag Prediction Workshop Model Surface Reconstruction



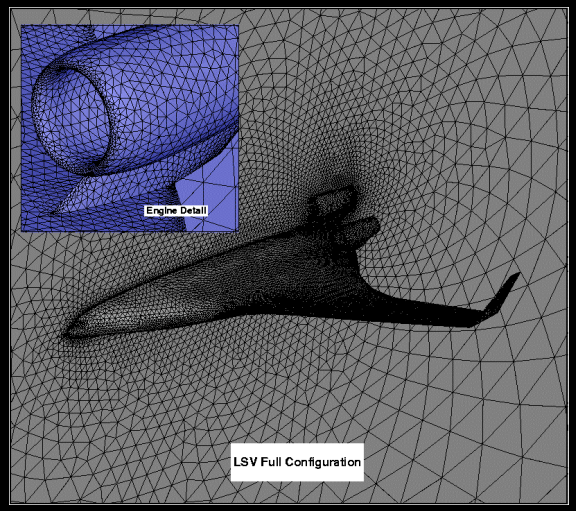
Wing fairing surfaces reconstructed from digital measurements acquired by QA and incorporated into existing CAD model by GEOLAB.

Fuselage, wing, & sting surfaces in CAD model updated to reflect as-built geometry. Unstructured grid will be generated to support analyses being run for CFD code validation.



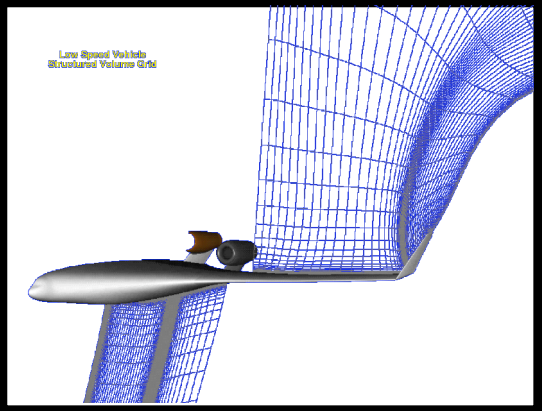
DLR-F6 CAD & wind tunnel models

Geometry Management

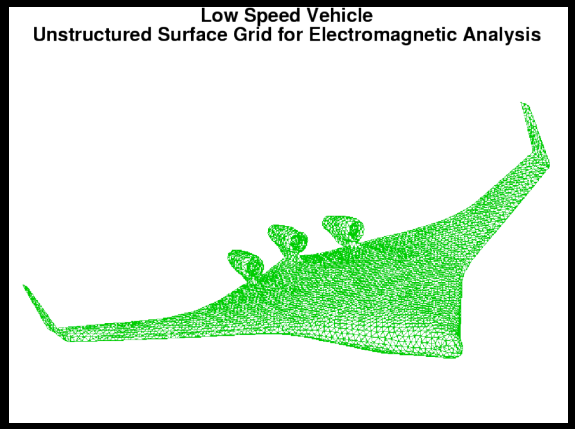


Aerodynamics

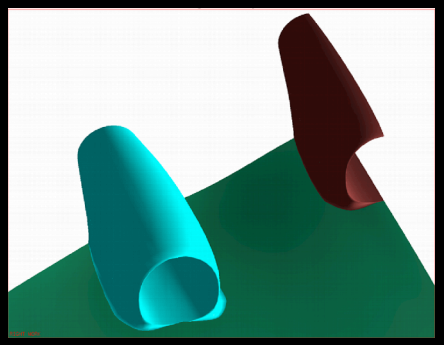
Low Speed Vehicle
(LSV)

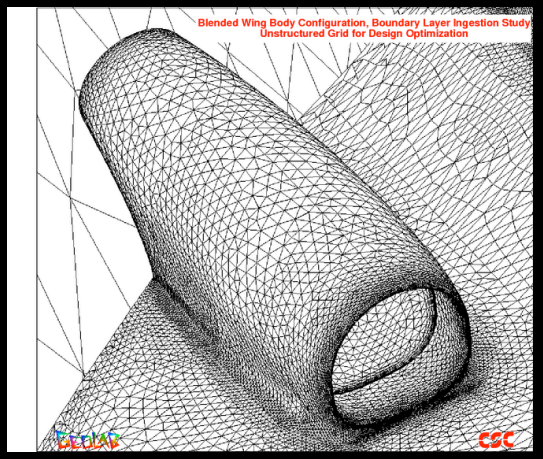


Multidisciplinary Optimization



Electromagnetics





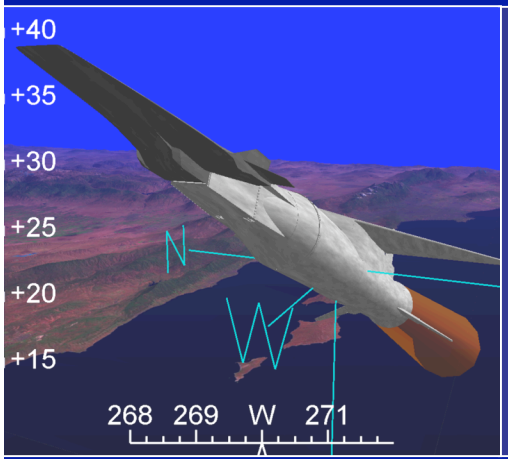
Boundary Layer Ingestion Design
Study

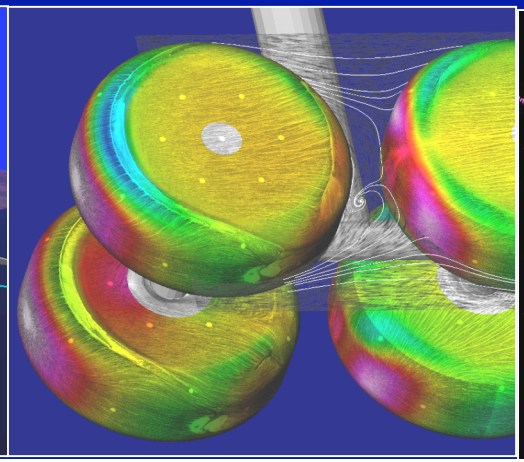
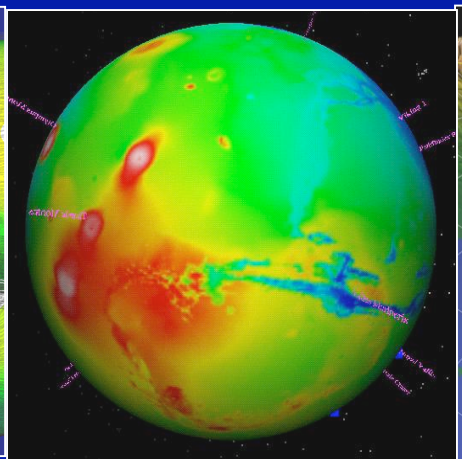
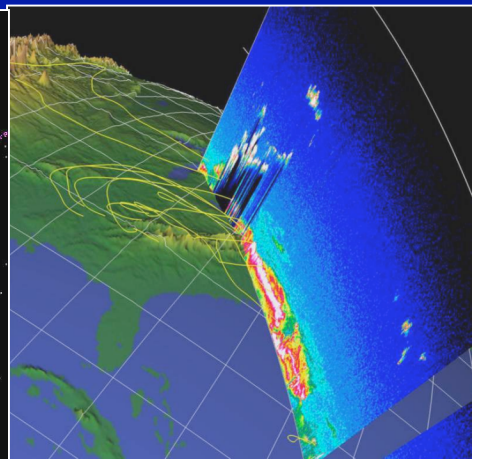
GEOLAB Summary

- Maintain proficiency in CAD, grid generation, geometry data exchange
- Facilitate communication between design/analysis & manufacturing to link research data and hardware
- Provide project teams in geometry verification and data distribution services
- Leverage common elements between researchers' requests to minimize duplication of effort and promote reuse of previously generated grids and geometry models

Data Visualization and Analysis Lab (DVAL)

- Real Time Flight Visualization
- Wind Tunnel Data Fusion
- Photogrammetric Scene Reconstruction
- Collaborative Immersive Environments
- Mission Planning & Analysis Tools
- Satellite Data Visualization



Data Visualization and Analysis

- Open shop laboratory in B1268, RM 1051
- 7 linux and windows high end PC and Mac pro workstations, and a Fakespace Work Wall with haptic devices for human/computer interaction.
- Trained staff available to partner with the research community on specific visualization applications.
- Tasks of moderate duration – weeks to months
- Approximately 10 major projects/year

Data Analysis and Visualization Software Inventory

Visualization software:

- Fieldview, Ensight, Tecplot, Matlab
- Satellite Toolkit, Kitware VTK
- OpenSceneGraph
- 3D Studio, Softimage, Maya, Final Cut Pro

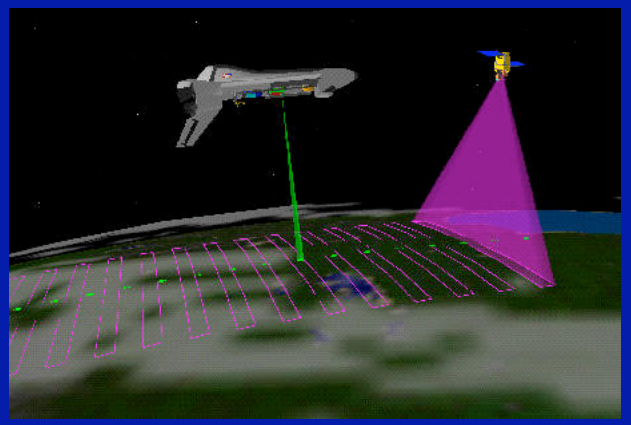
Collaborative software:

- Cavelib

Programming software:

- Microsoft Visual C++, Gnu C++ compilers
- Mac Xcode Development Environment

Data Visualization & Analysis Lab

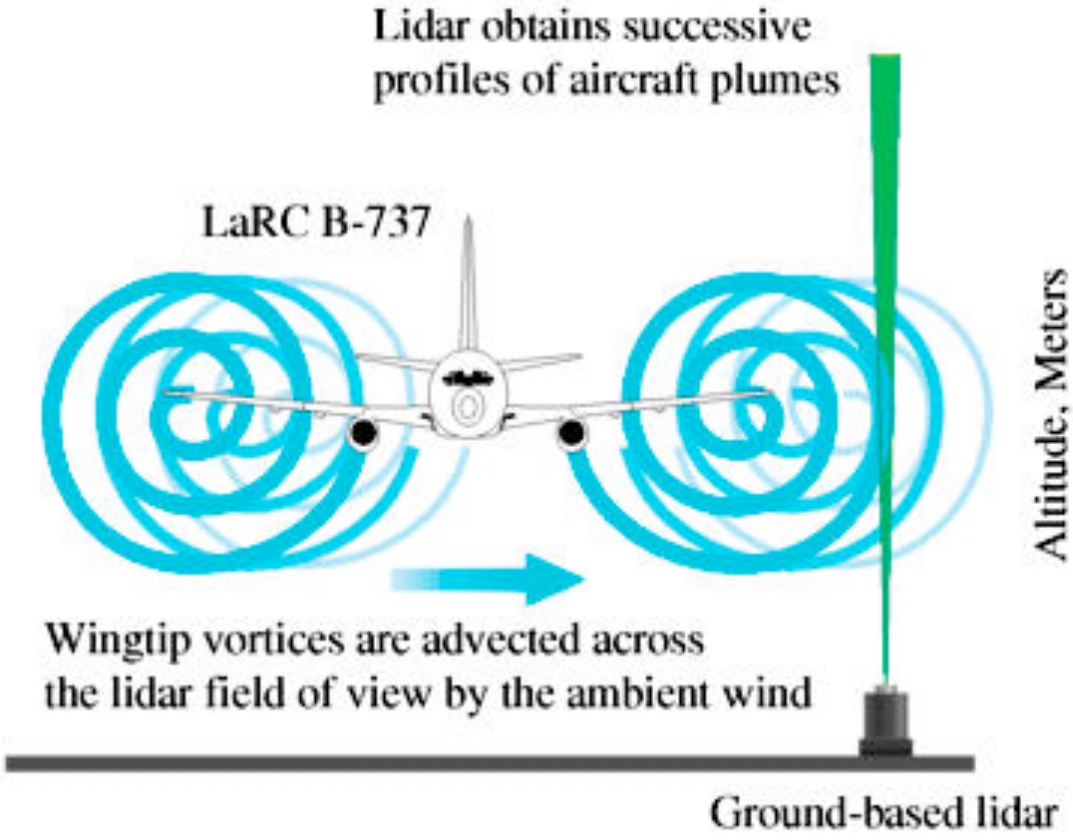


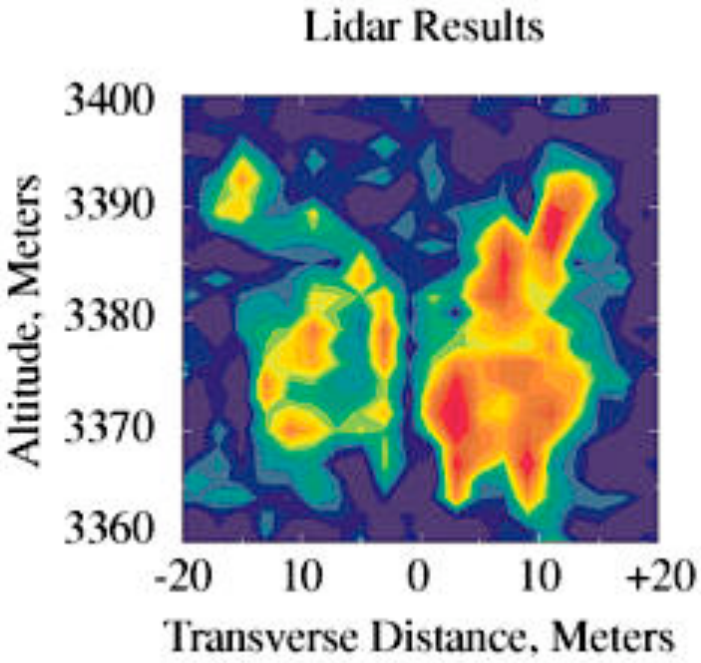
LIDAR mission planning

Application Areas and Projects

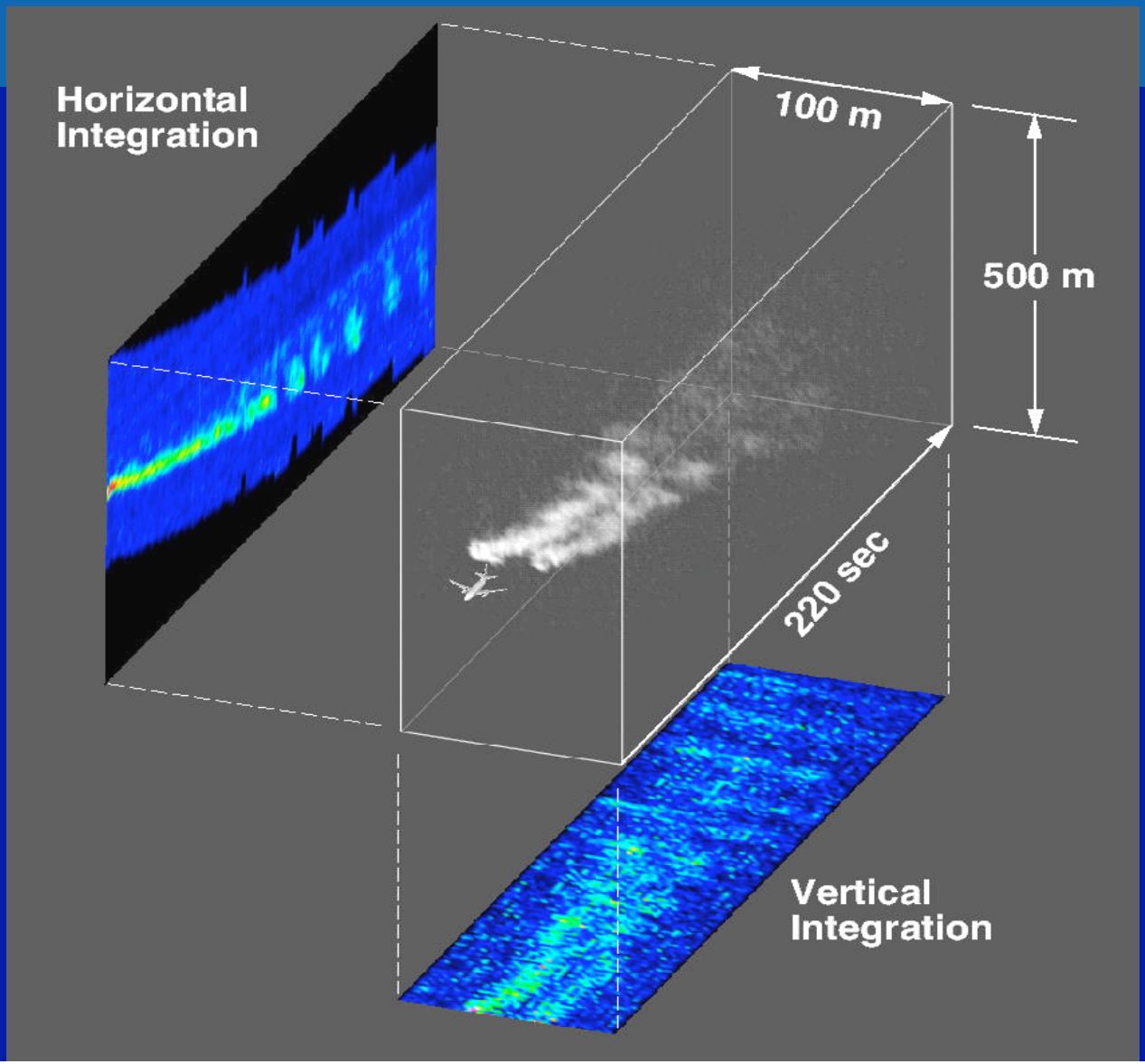
- Computational Fluid Dynamics
- Wind Tunnel Fluid Dynamics
- Remote Sensing
- Atmospheric modeling and simulation
- Satellite / Sensor Mission Planning
  - Clarreo, Calipso, CEOS, ALHAT
- Data/photo cataloging
- Airborne atmospheric sensor visualization
- Radiation shielding visualization
- Aircraft fly-over simulation
- Support of accident investigations
  - HyperX and Shuttle

Atmospheric Data Visualization



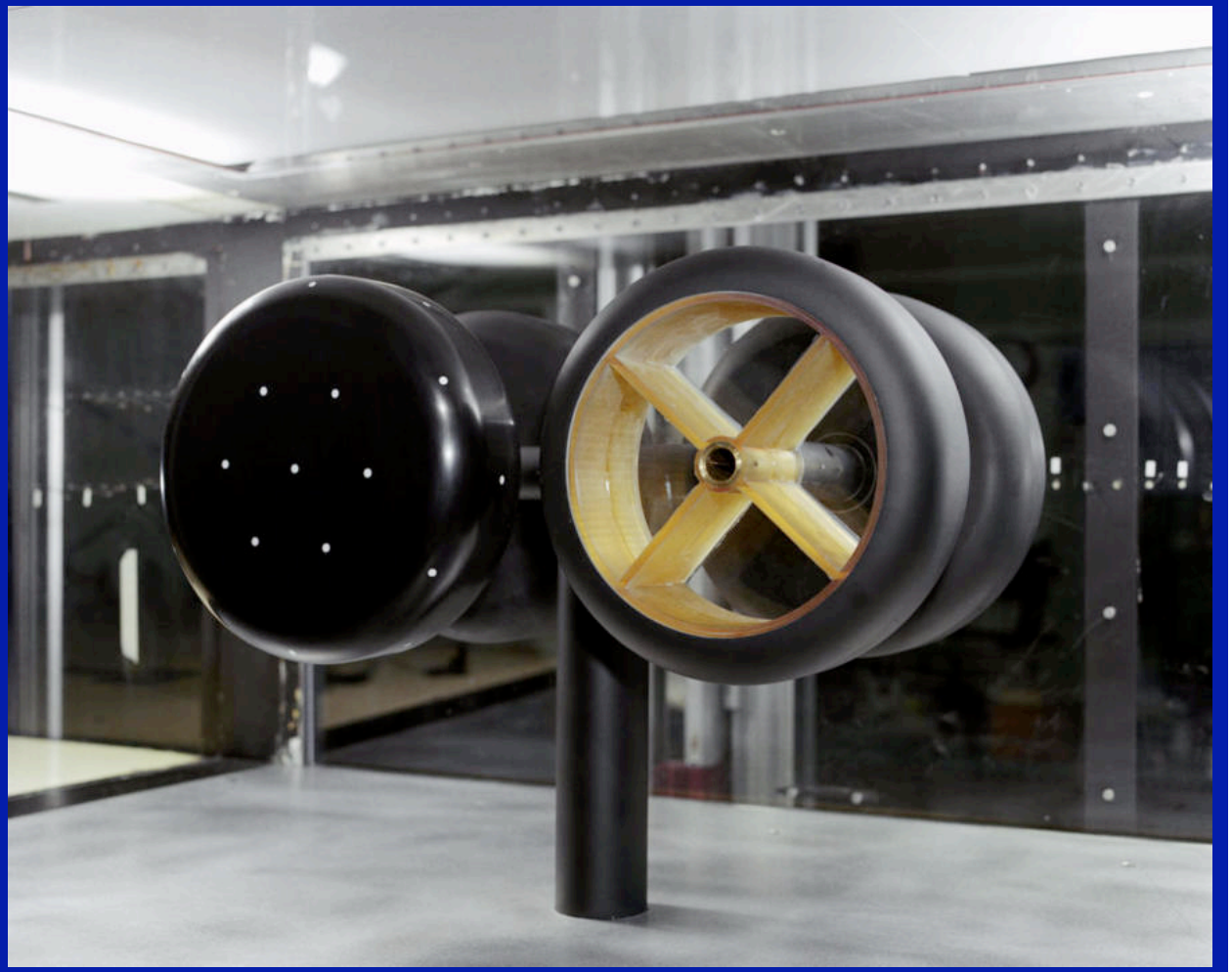


3-D Wake Visualization

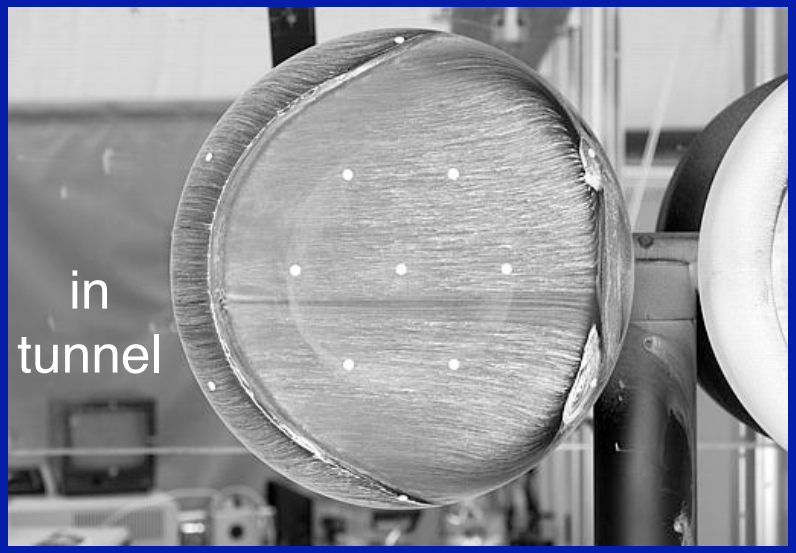


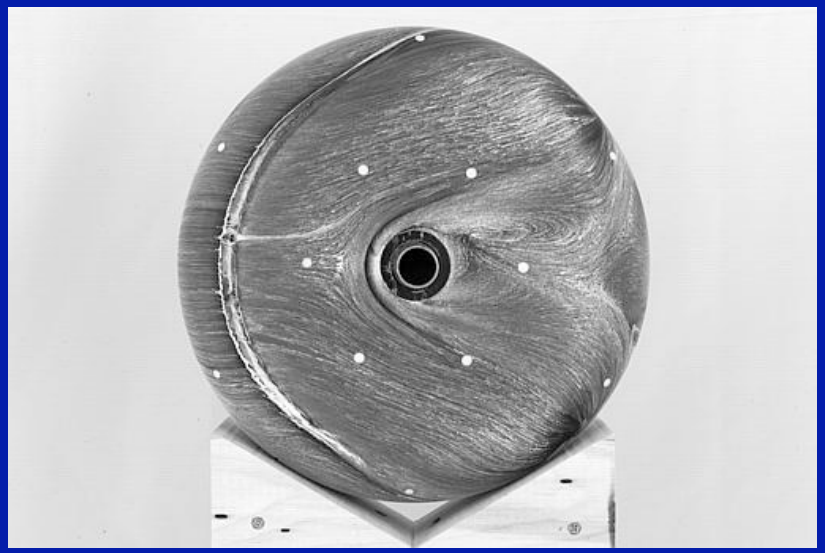
Data Fusion Example: Landing Gear Flow Visualization

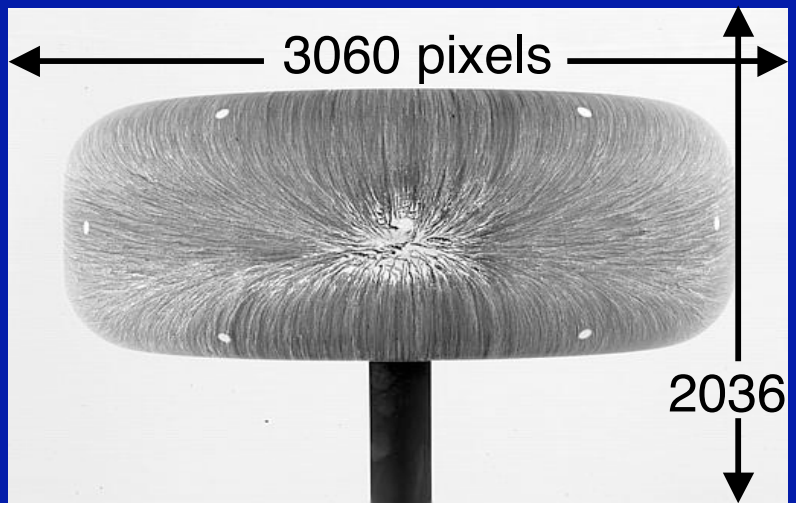
Landing Gear Model in the Langley Basic Aerodynamics Research Tunnel

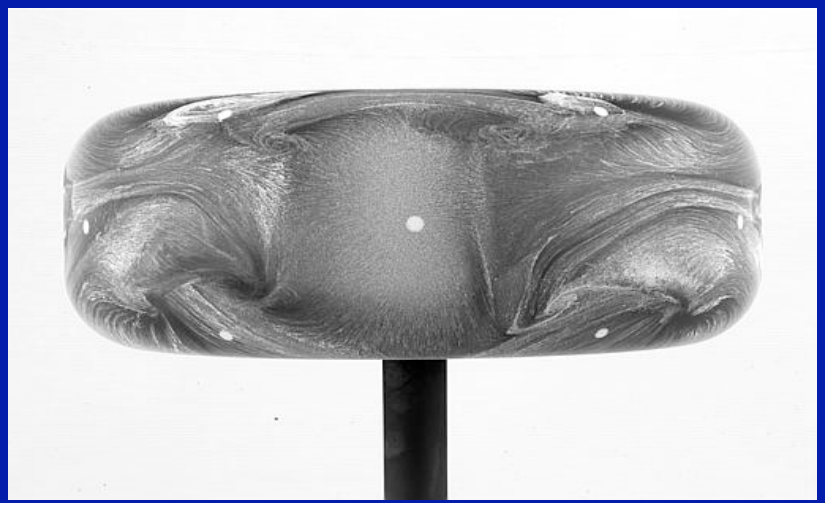


Sample Oil Flow Images from the Wind Tunnel

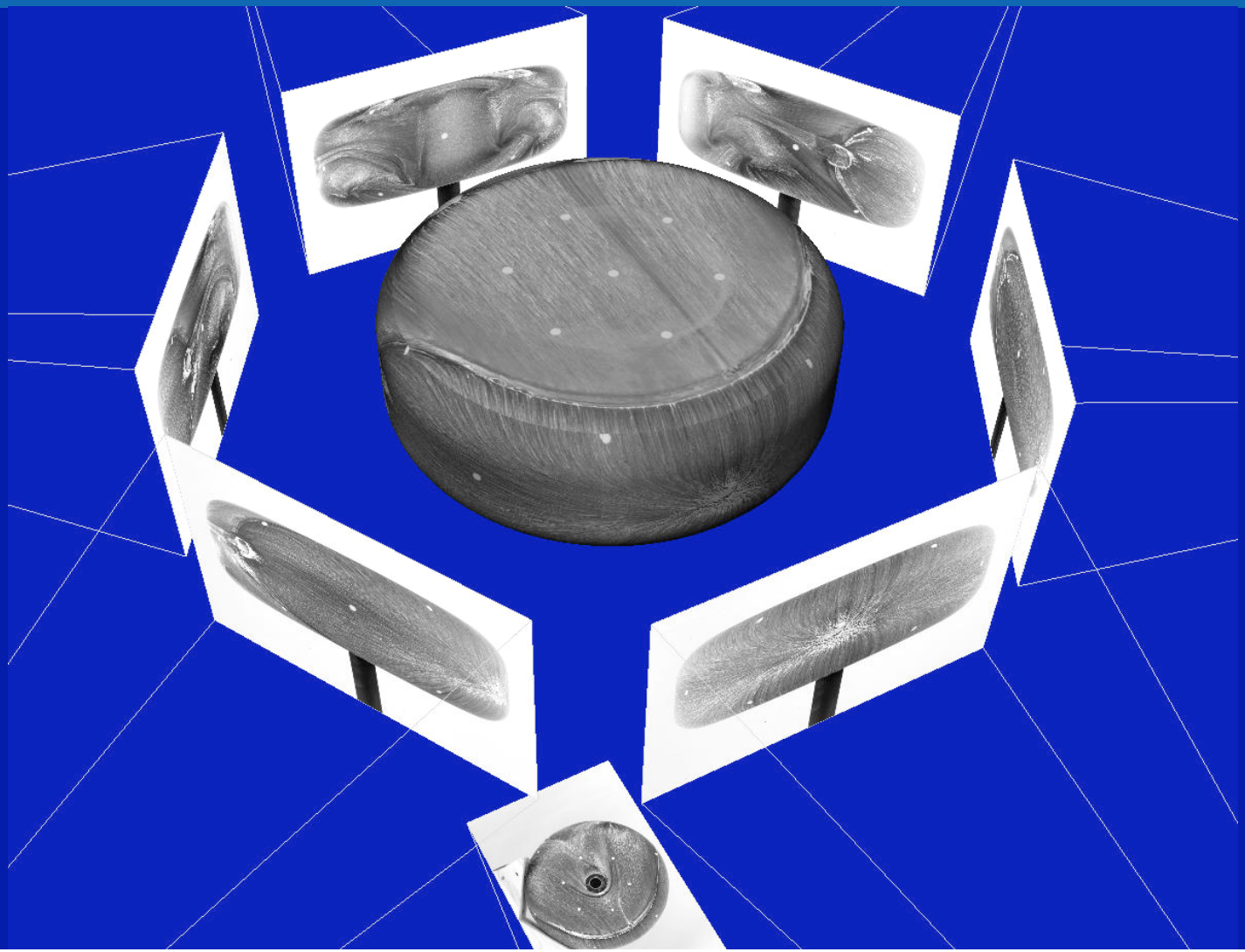




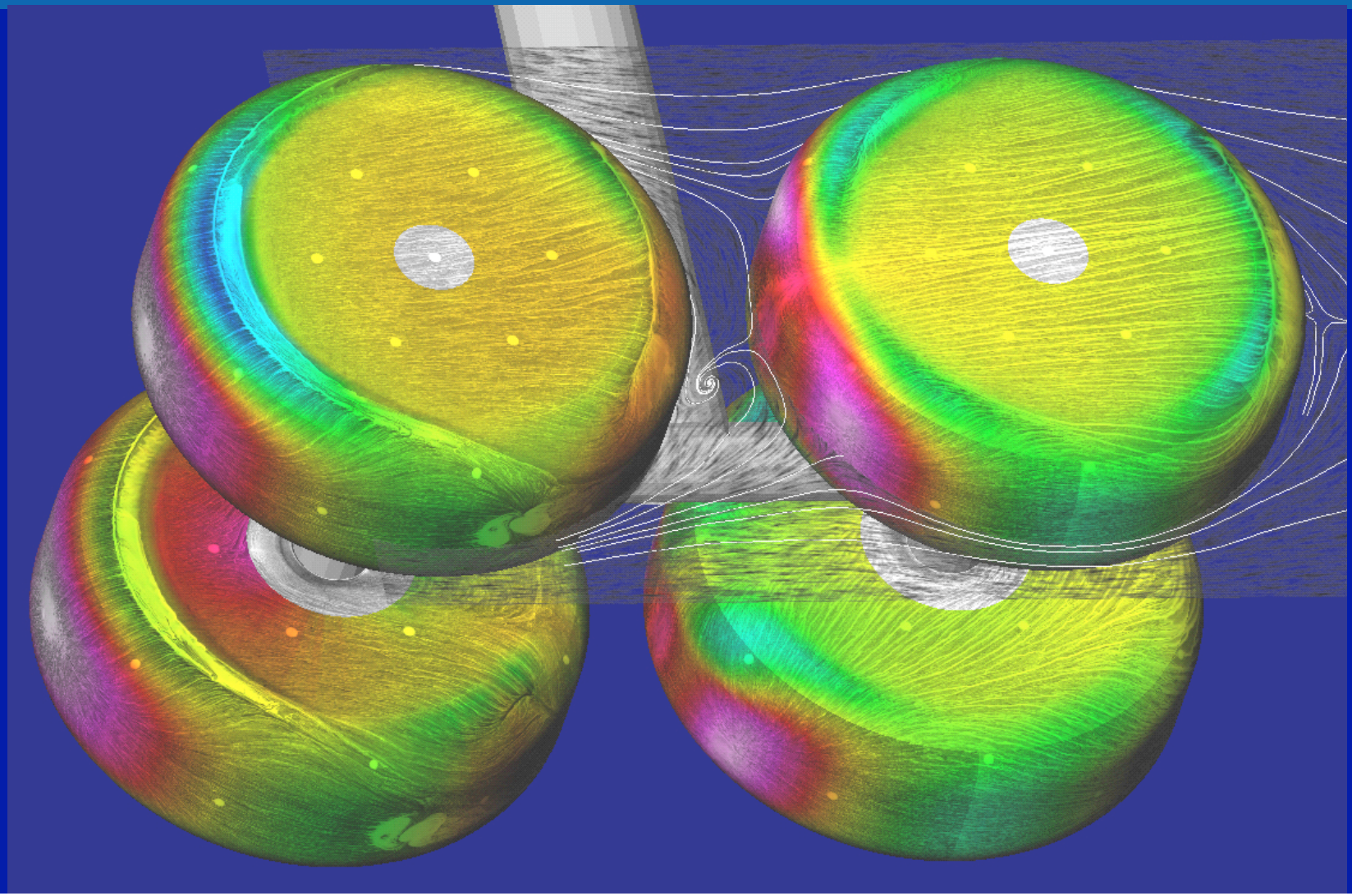




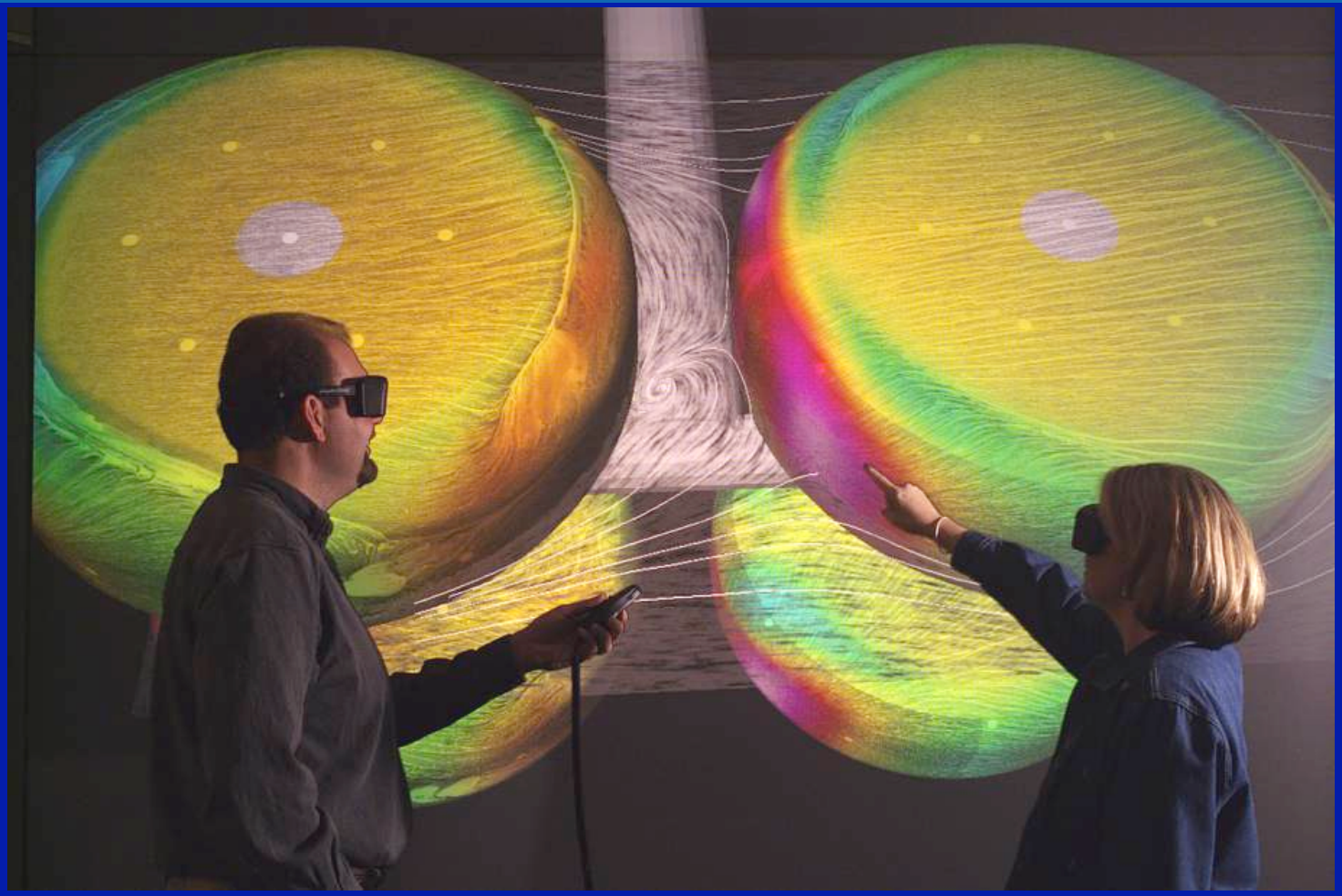
3-D Reconstruction from Multiple Camera Views



Data Fusion of Image, Scalar, and Vector Fields



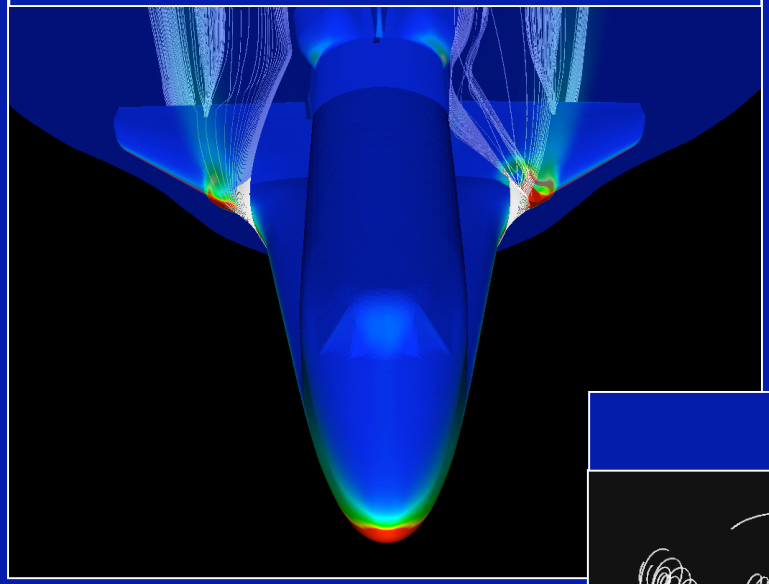
Immersive Display of Landing Gear Visualization



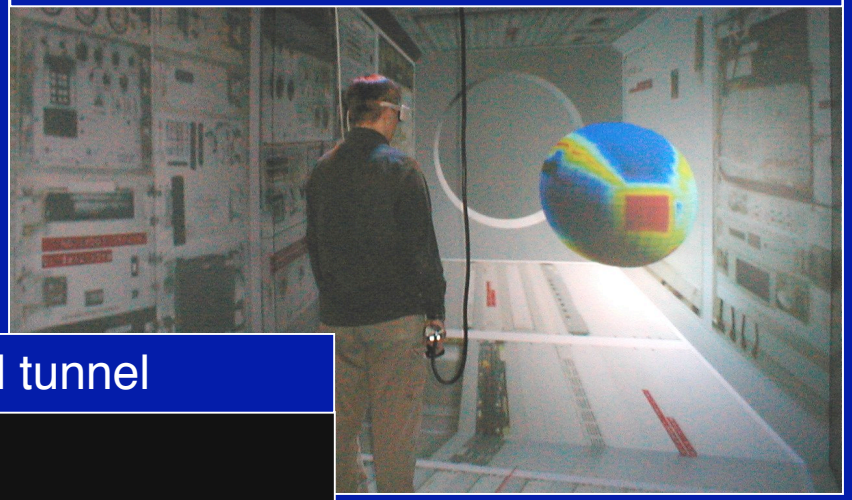
8’x6’ 1280x1024 Digital Immersive Workwall, Fakespace Systems

Collaborative / Immersive Virtual Environments

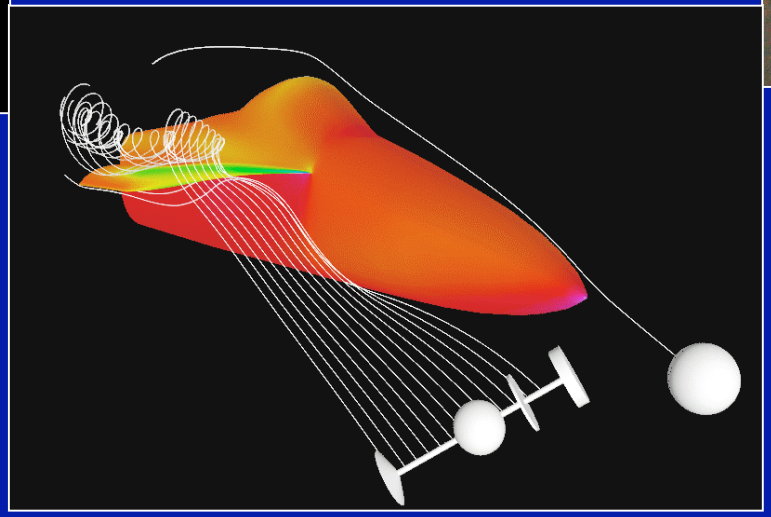
visualization of damaged Shuttle



Radiation field simulation of the International Space Station interior



virtual wind tunnel



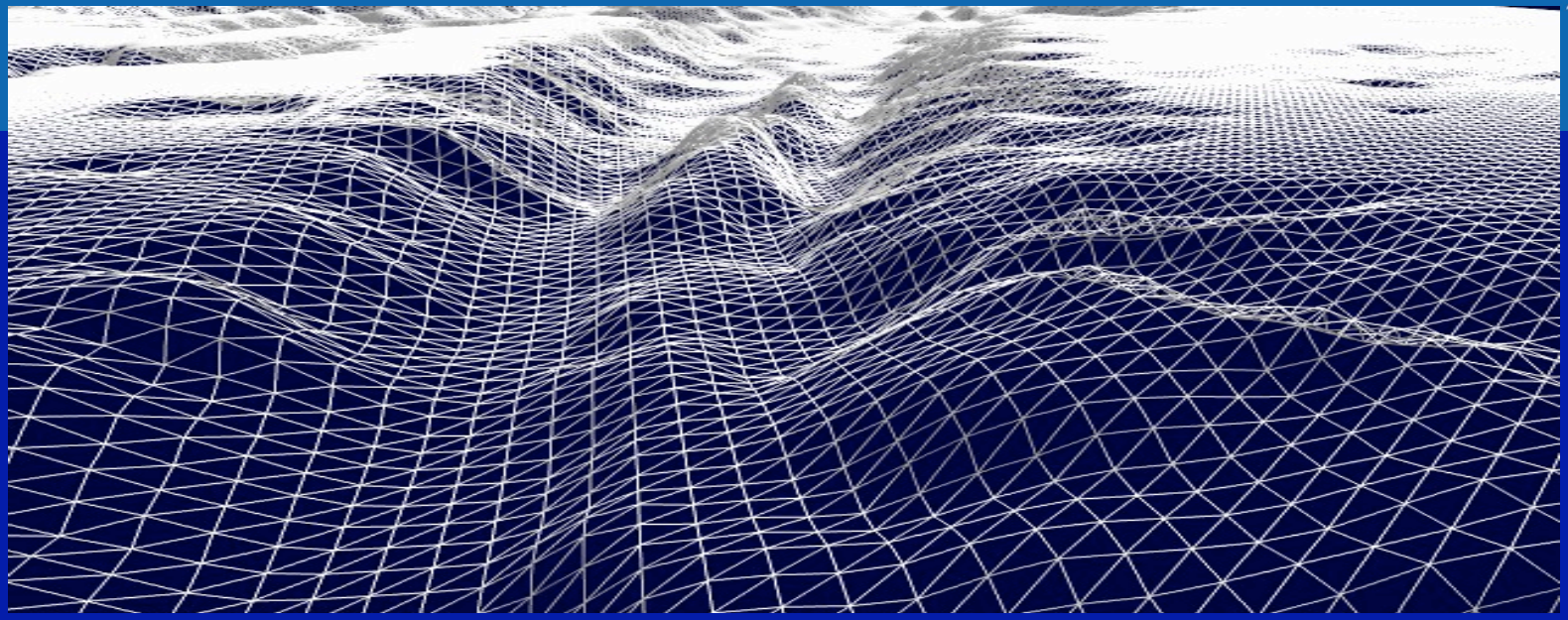
LaRC Facilities:

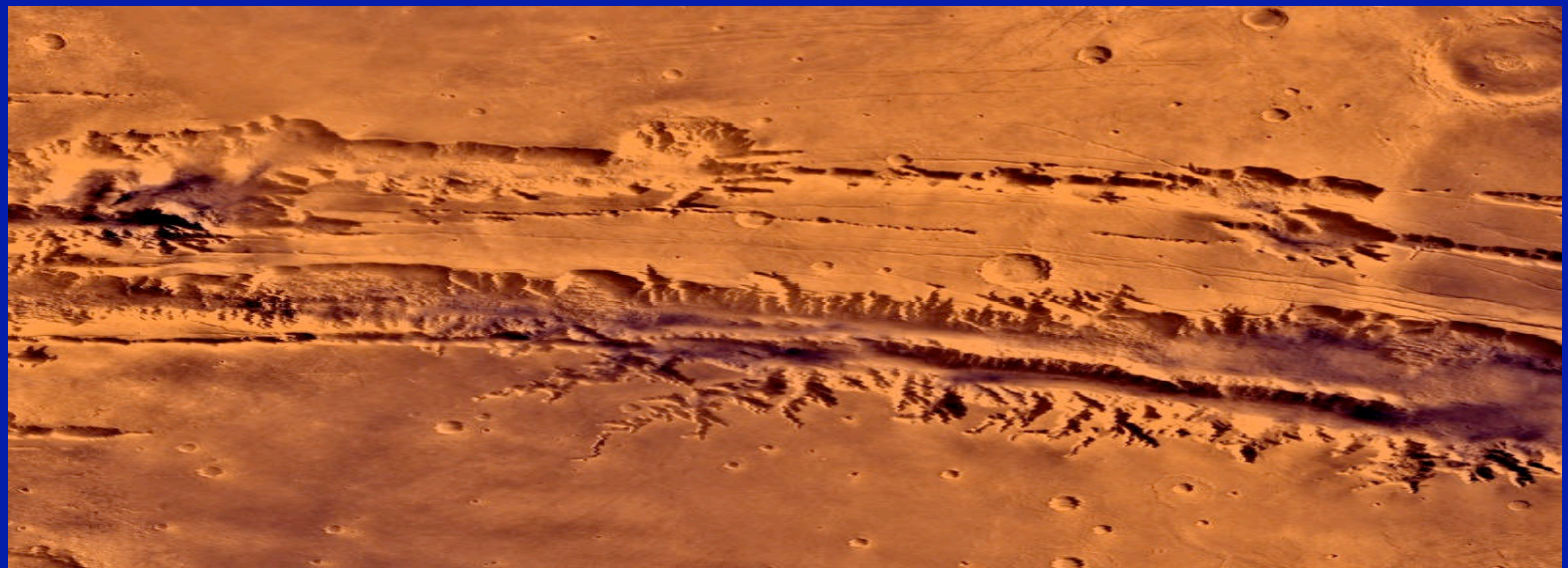
- CAVE Room
- Digital WorkWall
- Immersadesk

LaRC Software:

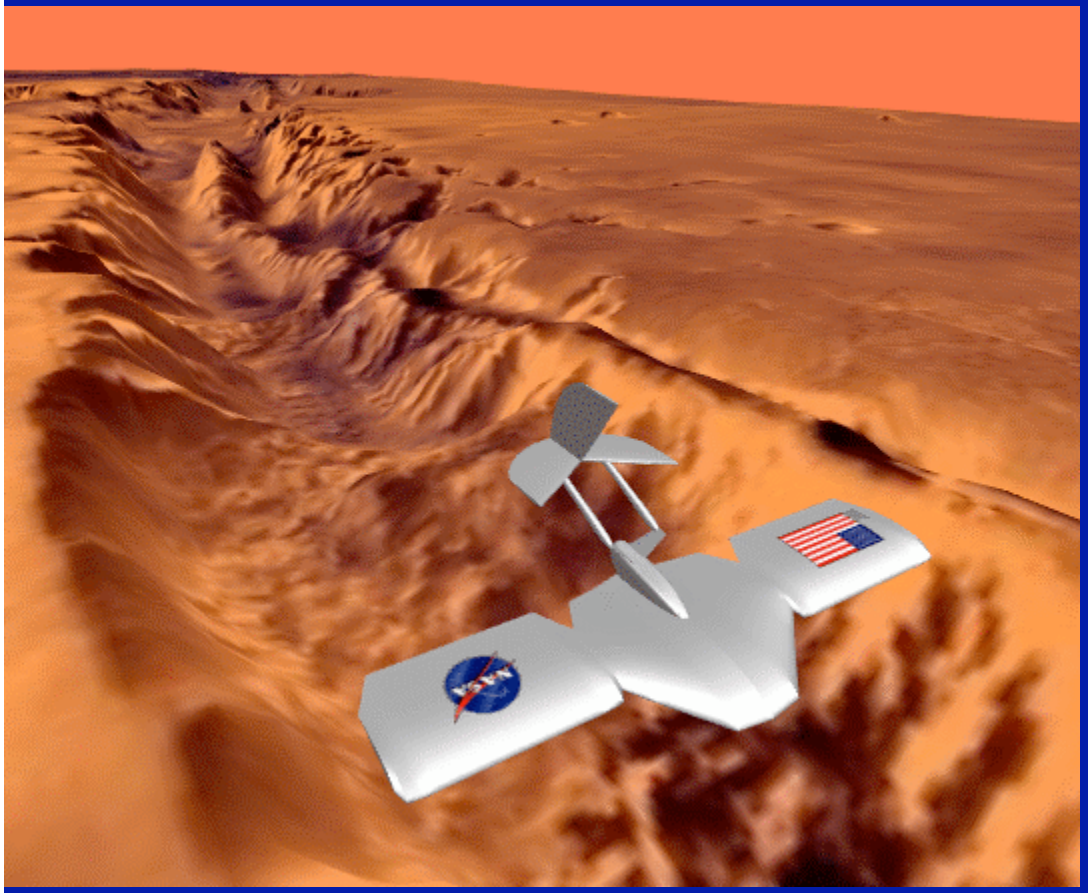
- CAVElib
- Ensight
- Custom-built

Terrain Visualization

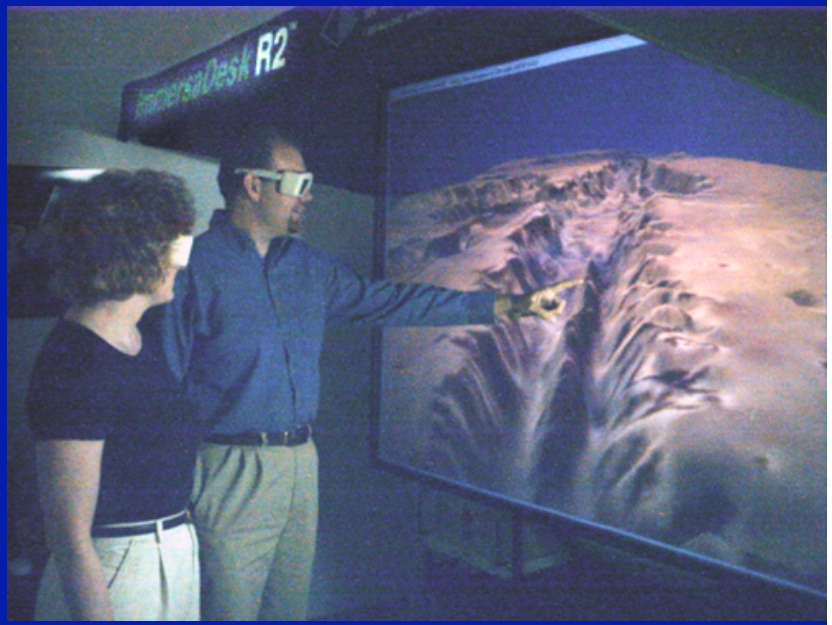




Immersive Mission Planning



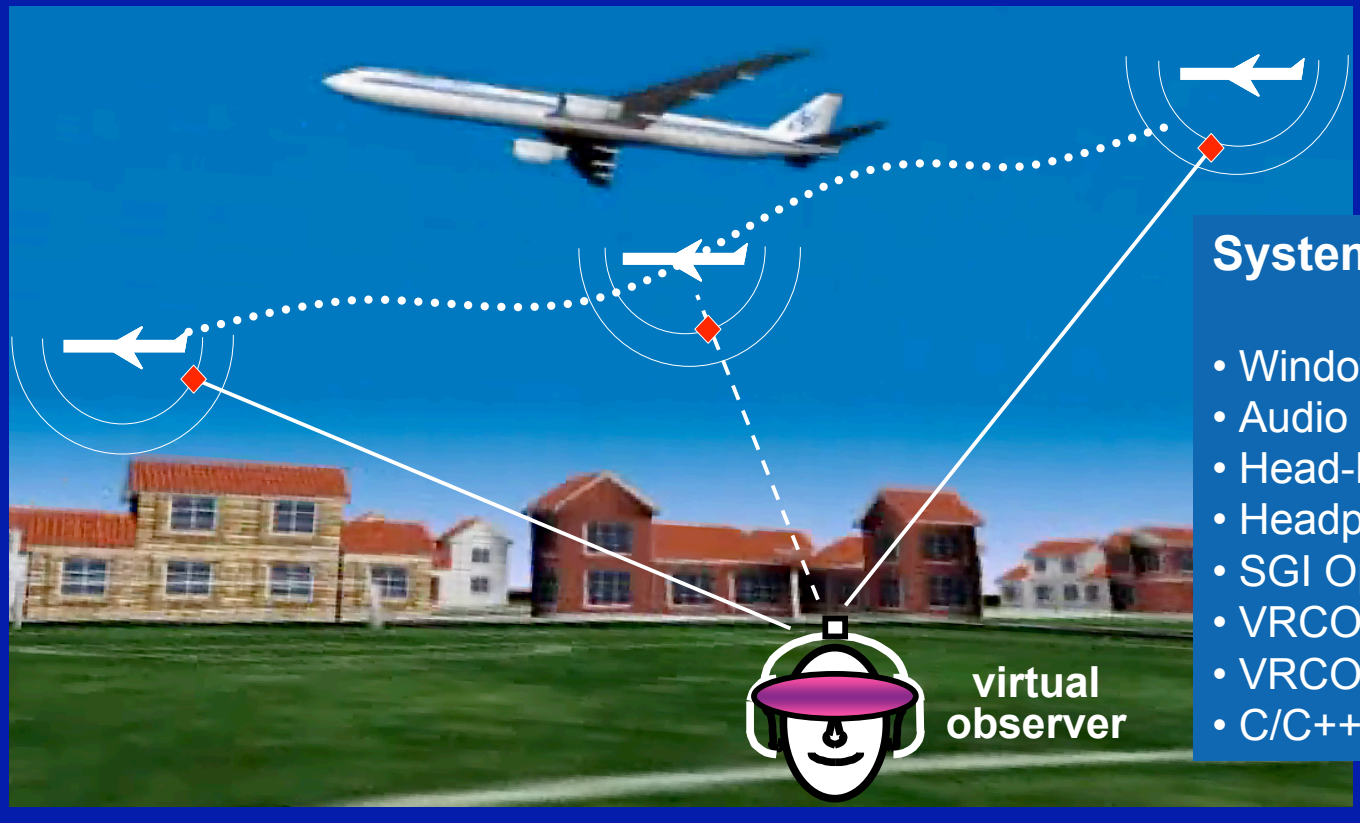
Mars Airplane Concept



Immersadesk display

Community Noise Test Environment and Aircraft Source Noise Generator

An immersive acoustic-visual environment for presenting both synthesized and recorded aircraft flyover noise to a virtual listener on the ground, for use in subjective testing environments. Directional sound is synthesized by modeling multiple point sources of aircraft noise (left/right engines, forward/aft fans, landing gear, flaps, etc.)



System Components:

- Windows PC, or Linux/IRIX
- Audio Server (AuSIM)
- Head-Mounted Display
- Headphones/Speakers
- SGI OpenGL Performer
- VRCO CAVELib software
- VRCO tracking software
- C/C++ simulation application

ConITS II

Geographic Information Systems (GIS)

William B. Ball

Center Operations Directorate

LaRC GIS Overview

gis-www.larc.nasa.gov

NASA Langley Research Center

October 2008

Brad Ball

William.B.Ball@NASA.Gov

LaRC GIS Overview

LaRC GIS Business Plan 2.0

NASA Langley Research Center
Hampton, Virginia
Prepared by the Geographic Information Systems Team

March, 2004

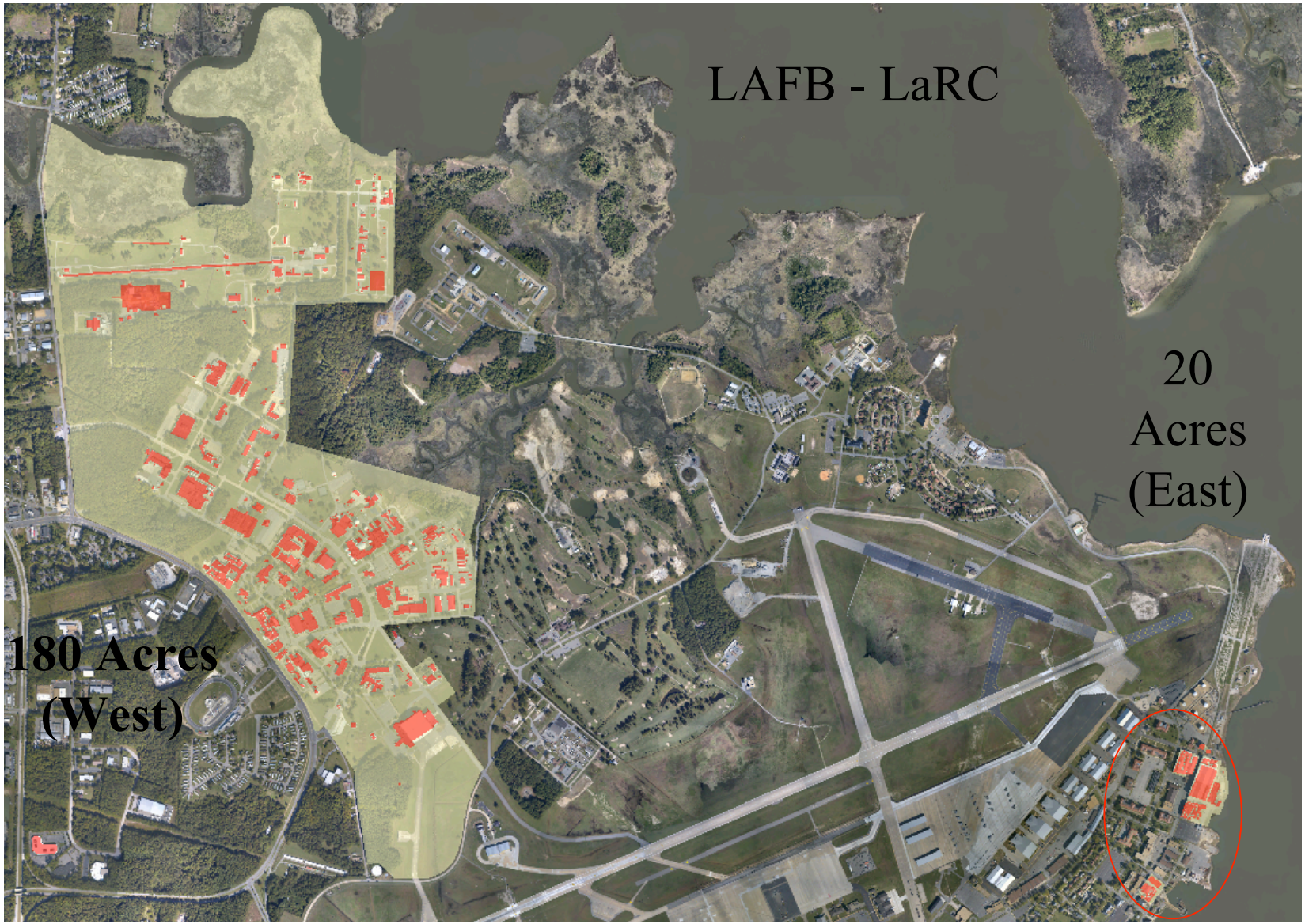
Infrastructure

Master Plan
Real Property
Utility systems
Facility Full Cost
Maintenance Management
Environmental
Space Utilization
Facility Reduction Planning

Science, Space, other

Aviation Safety/Synthetic Vision
Biomass Burning Analysis

Background

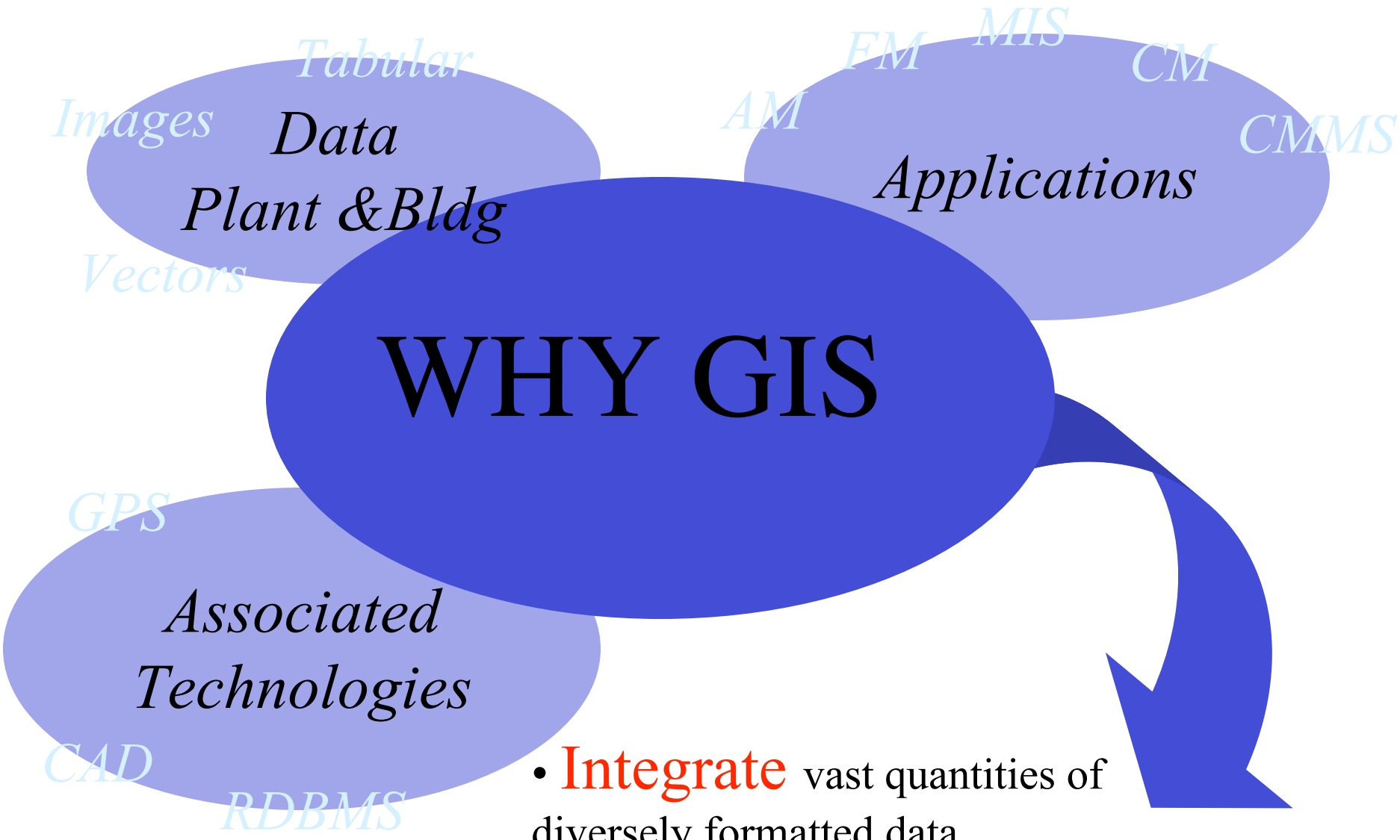


Background

- Langley Research Center
  - 300 Buildings
  - $2.5 B Current Replacement Value (CRV)
  - 6,200 rooms, 3.8 M gross sq. ft.
  - 3,500+ Personnel

Background

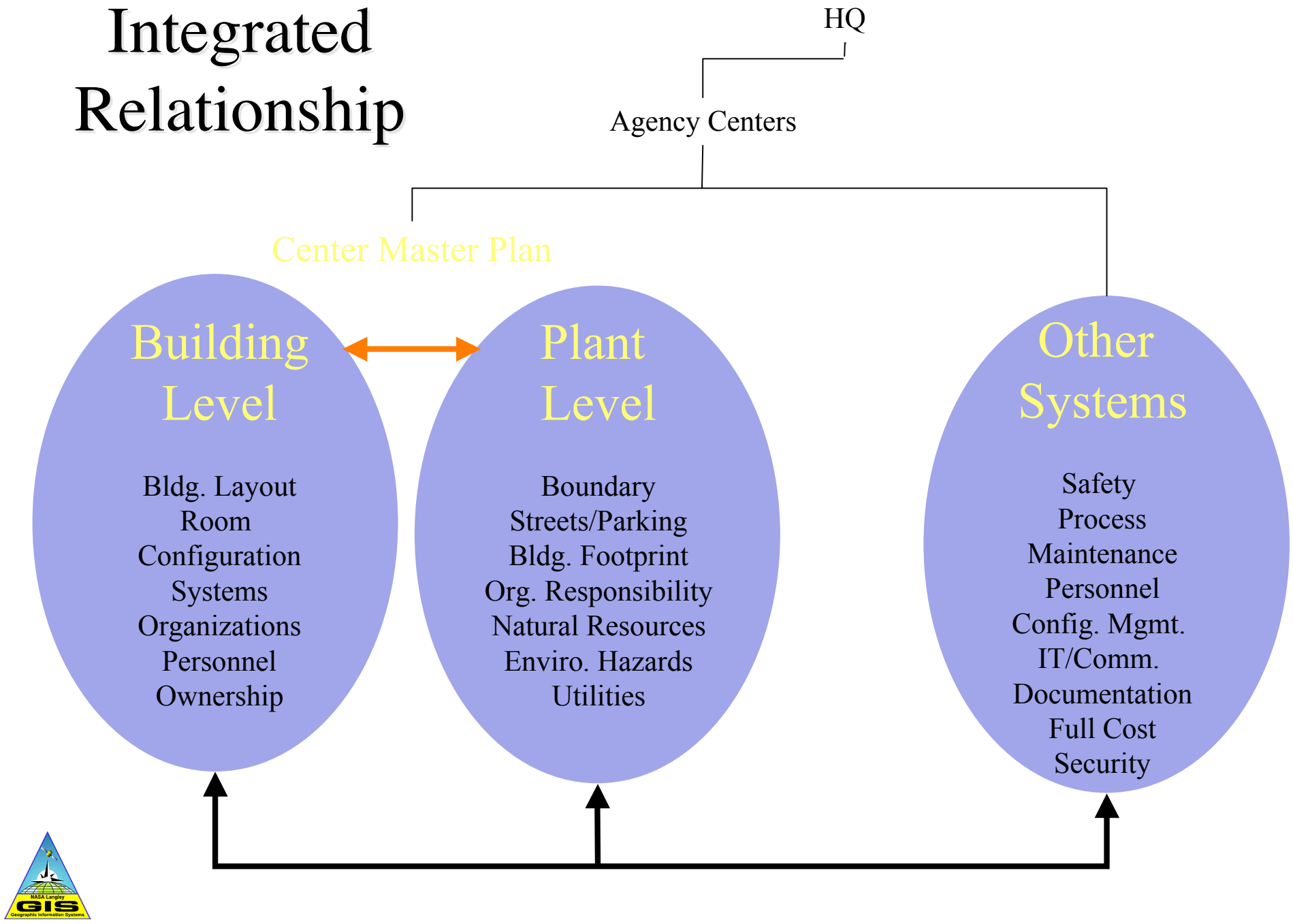
- GIS Team
  - GIS emphasis since ~1990
  - 3 FTE CS, ~9 WYE Cont. 9-18 Intern
  - $500K LaRC, ~$1M Partnering projects
  - Building level data management ~12 years



- Integrate vast quantities of diversely formatted data

- Point, Line, or Polygon ‘Assets’

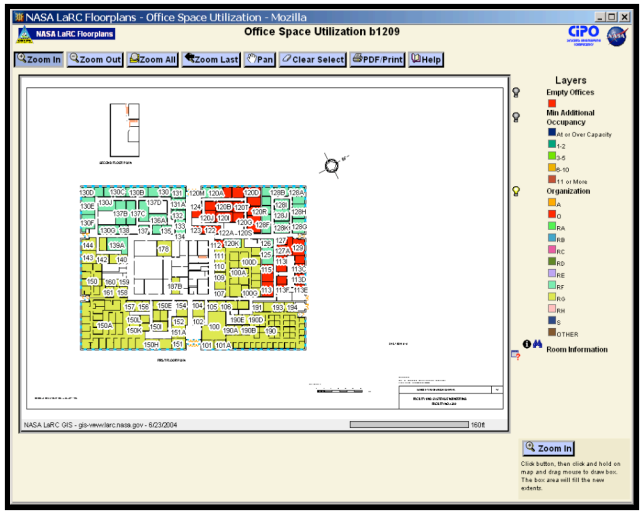
Integrated Relationship

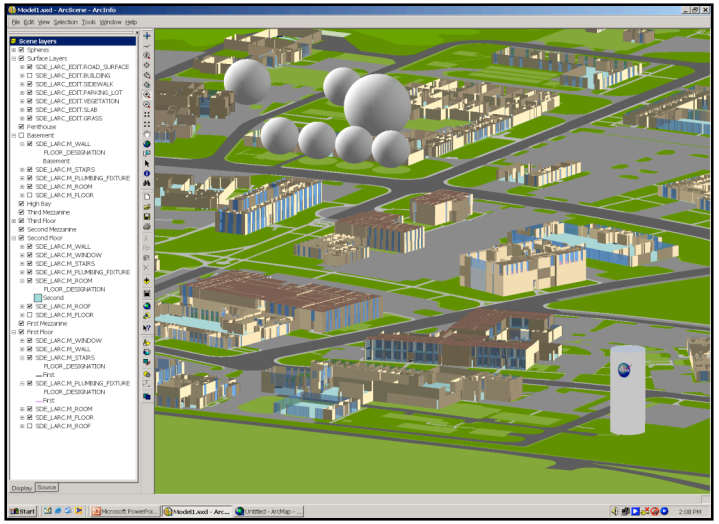


Goals for LaRC GIS Team

- Eliminate Redundancy
- Increase Accuracy
- Increase Accessibility
- Increase Effectiveness
- Enterprise System Interface

GIS





Spatial Integration

Tabular Data

ID
1
2
3

Spatial Data

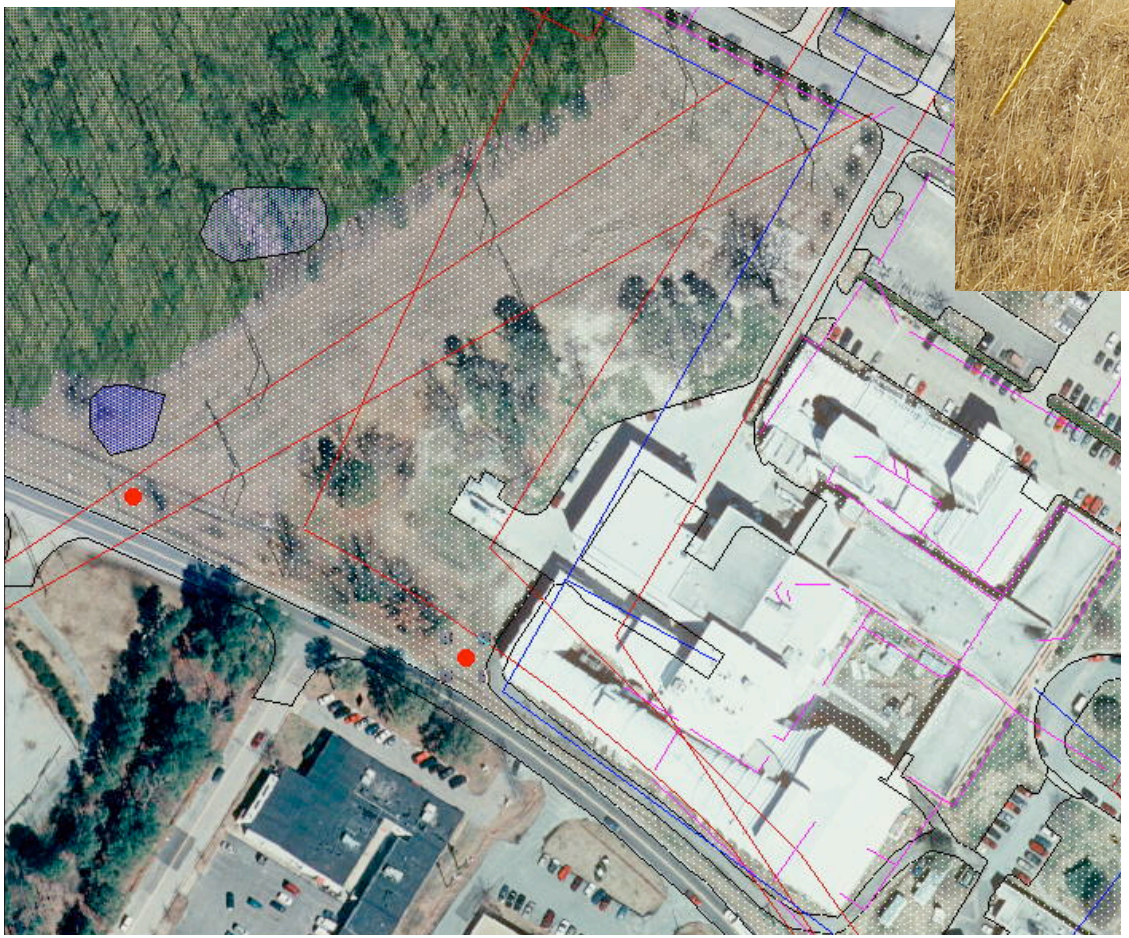
Buildings
Topography
Road Centerlines
Service Areas
Utility Services
etc.

Legacy Systems

ERP

NASA Langley GIS Geographic Information Systems

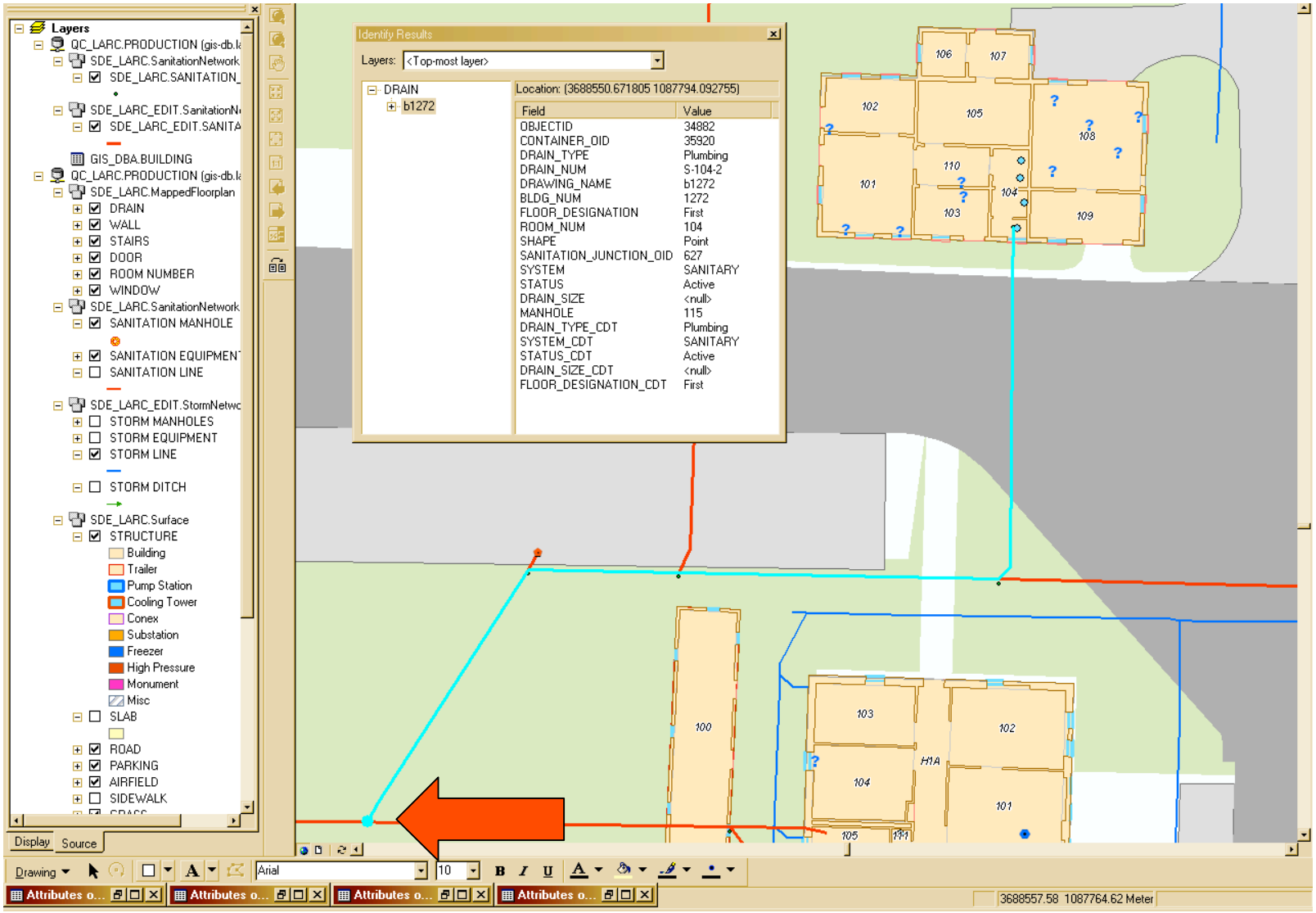
Most stringent requirements



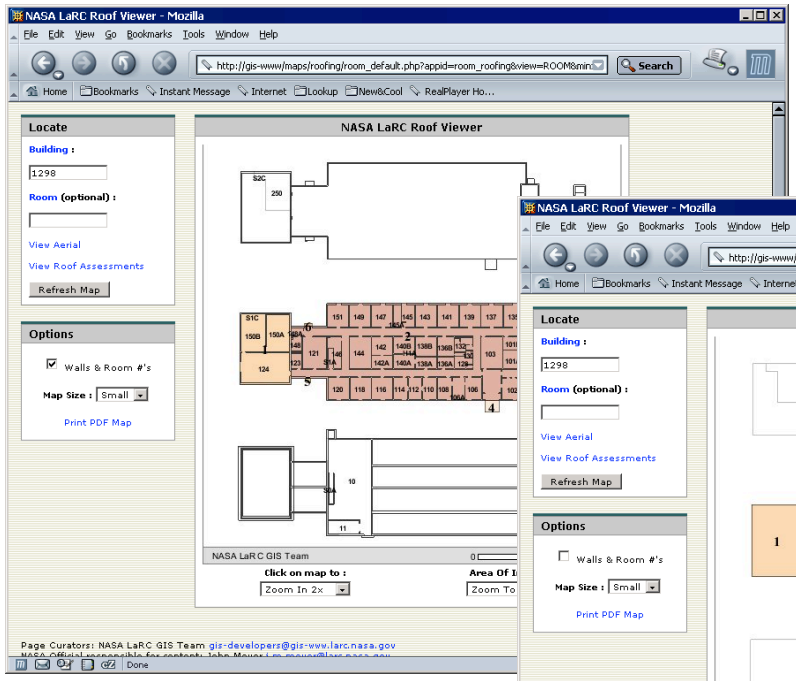
Geodetic Control & Air Photo

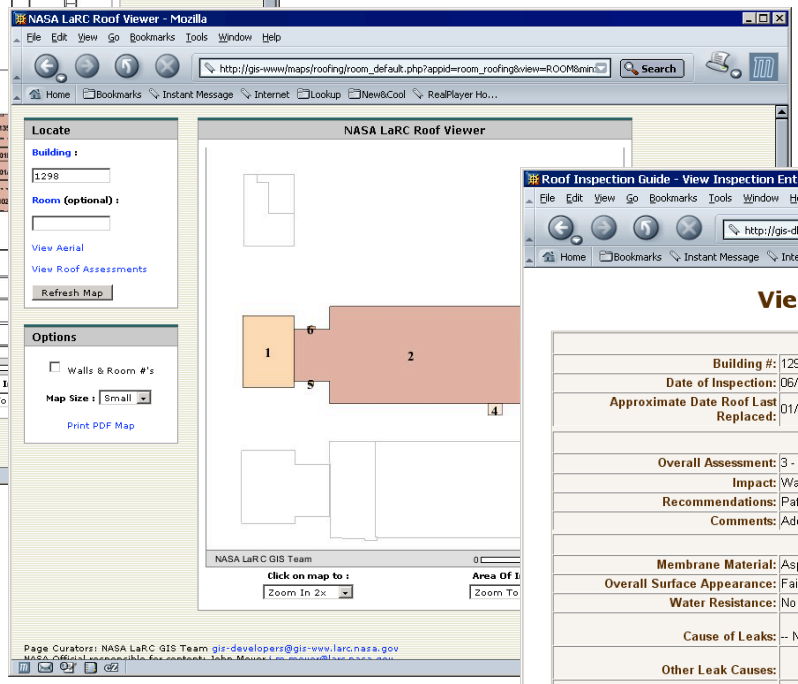
- high resolution/accuracy
- geo-referenced
- data overlays
- data generation

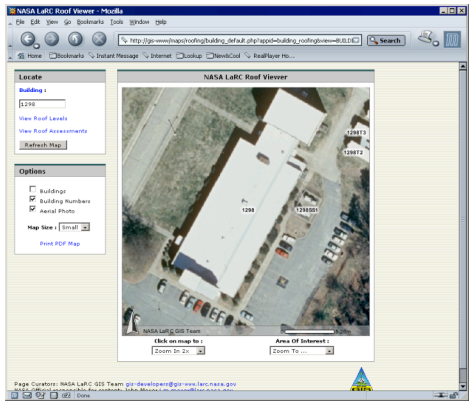
Facility / Utility Management

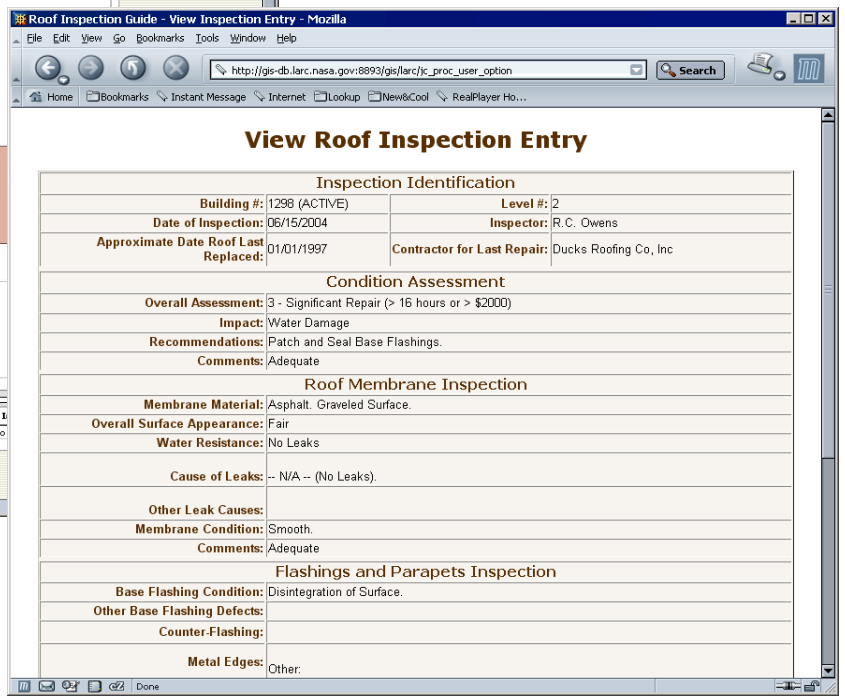


Maintenance – Condition Assessment

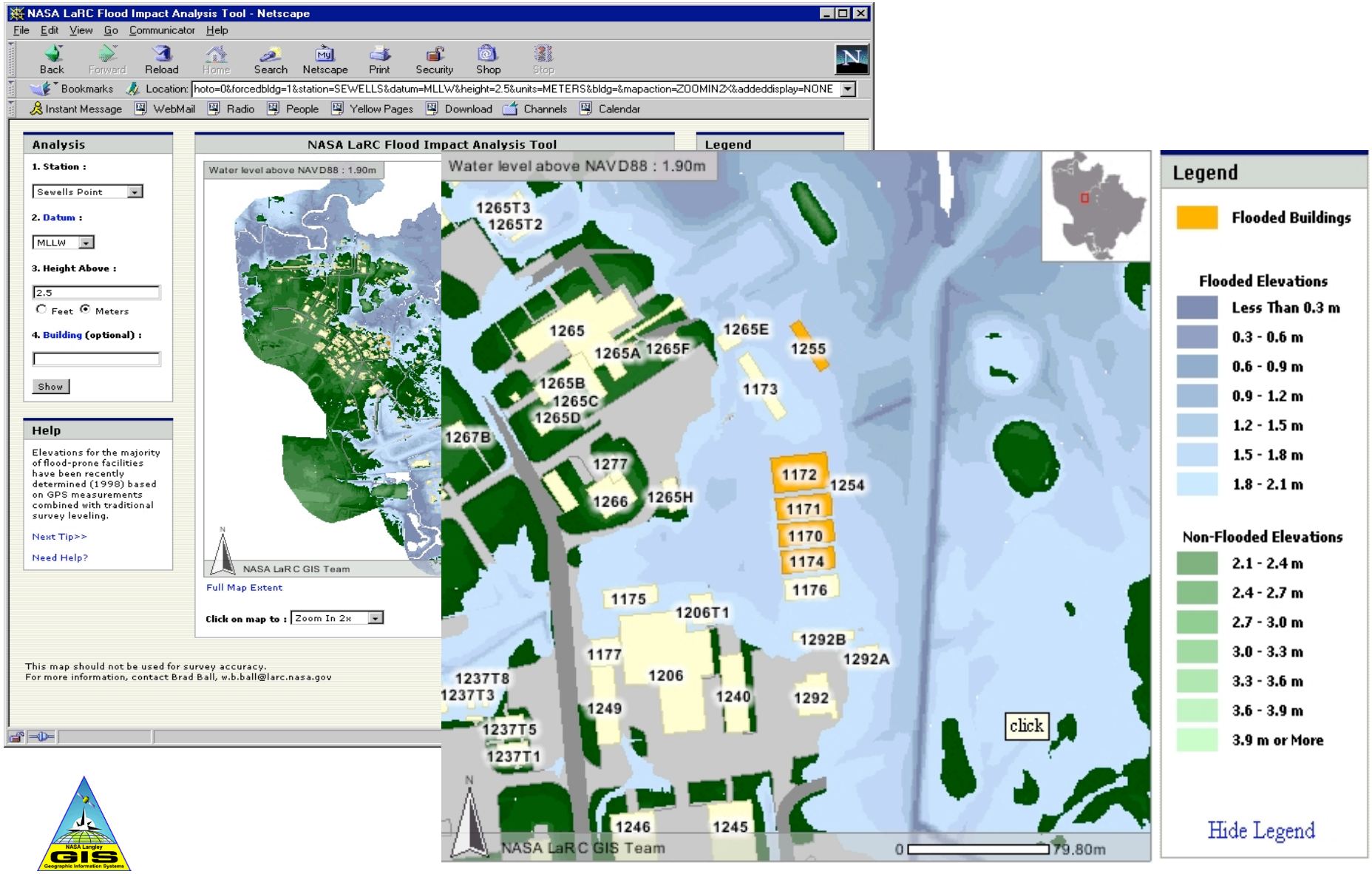




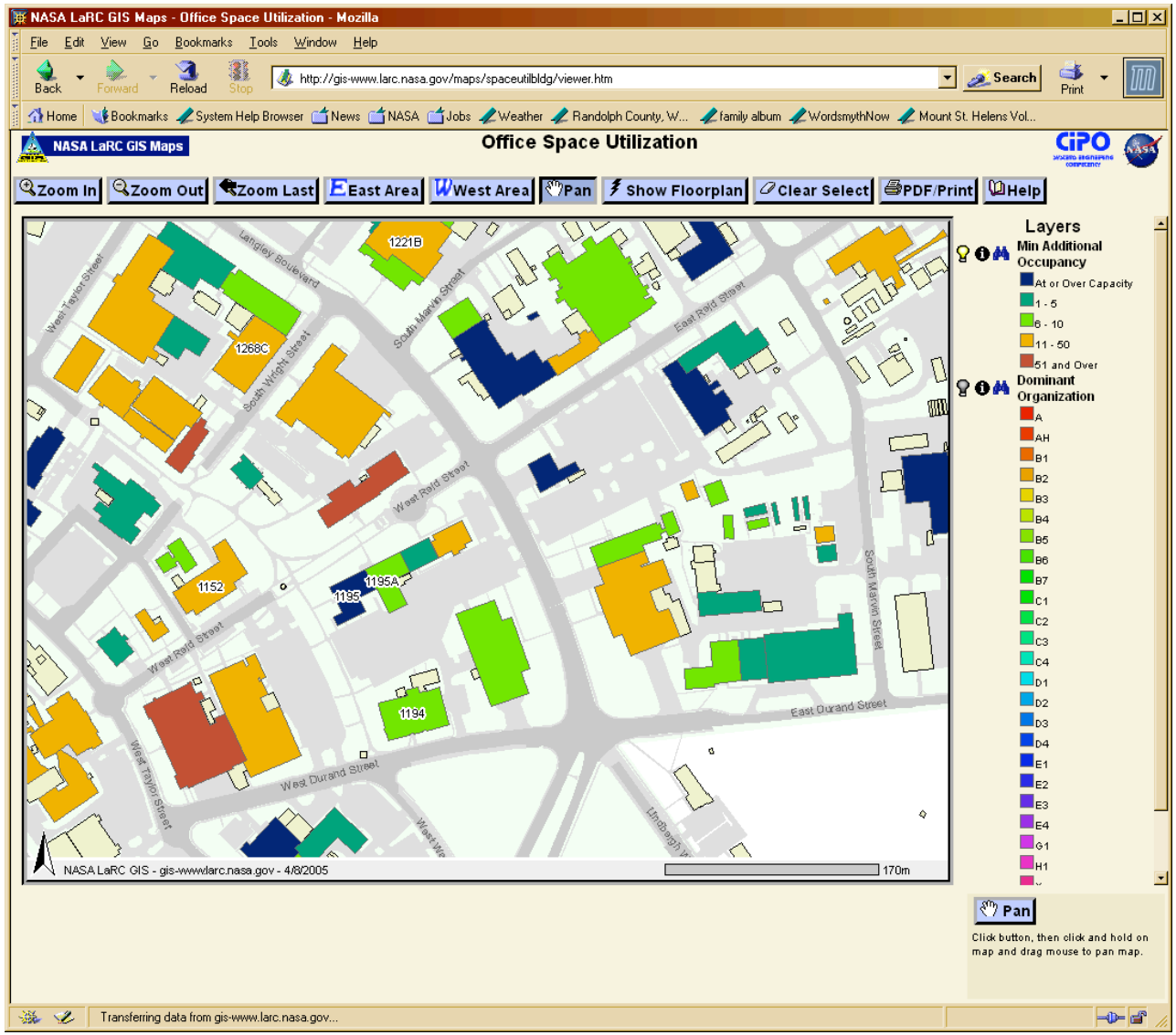




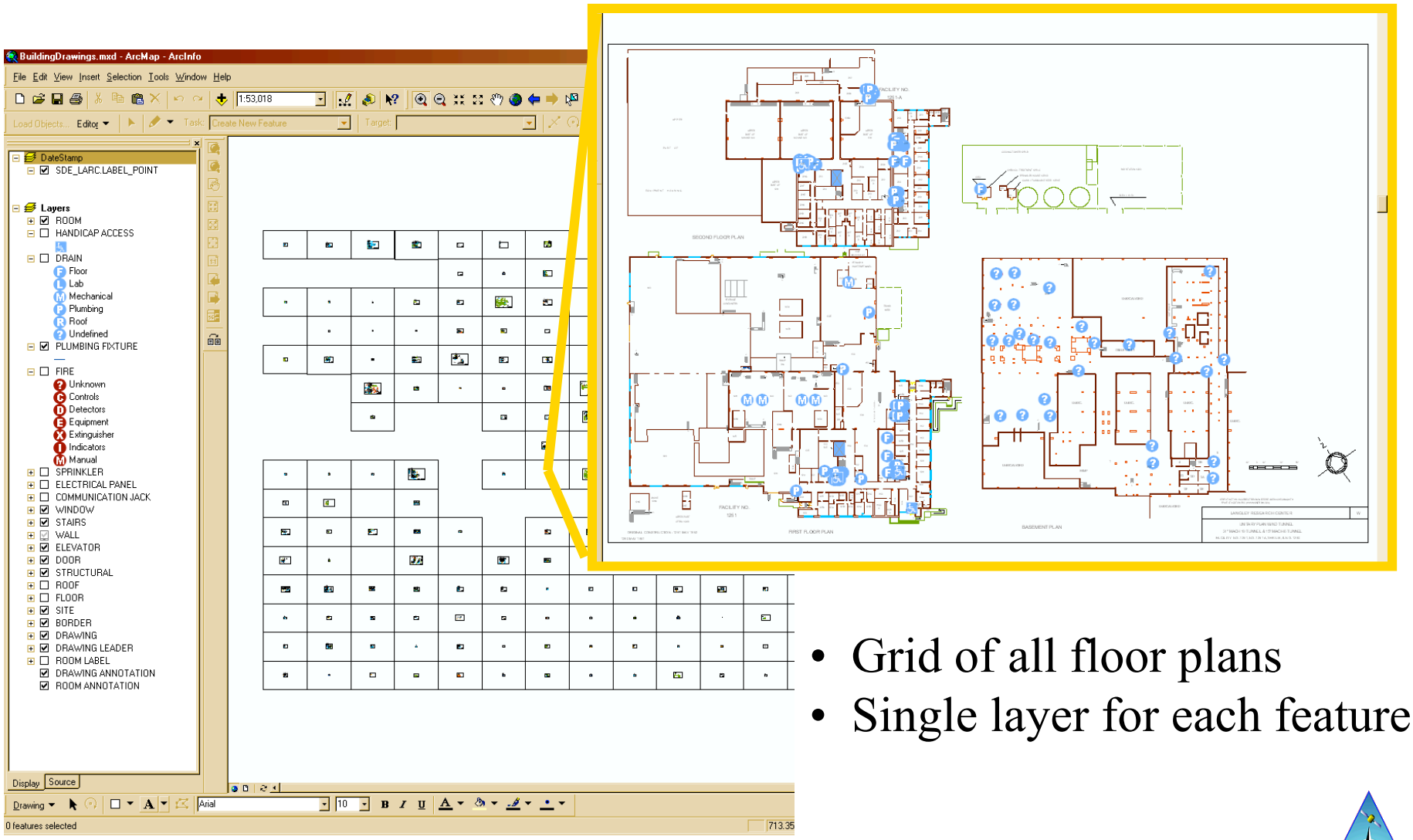
Flood Analysis



Space Utilization



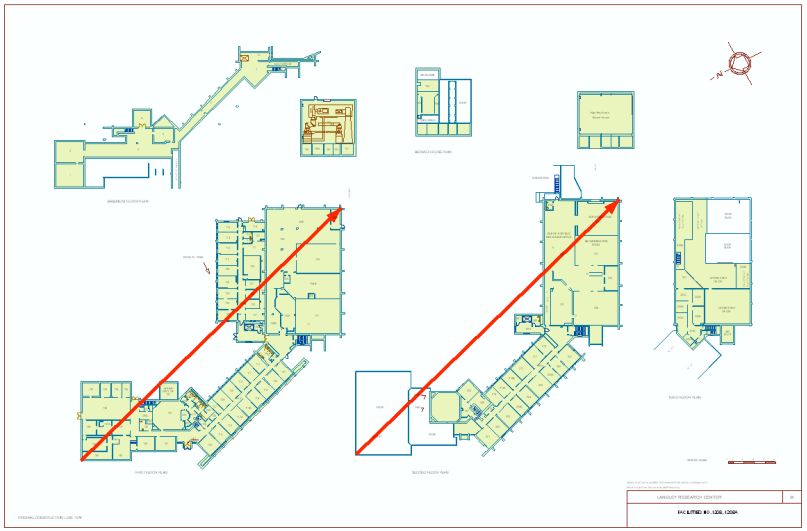
Floor Plans That Map to Geographic Space

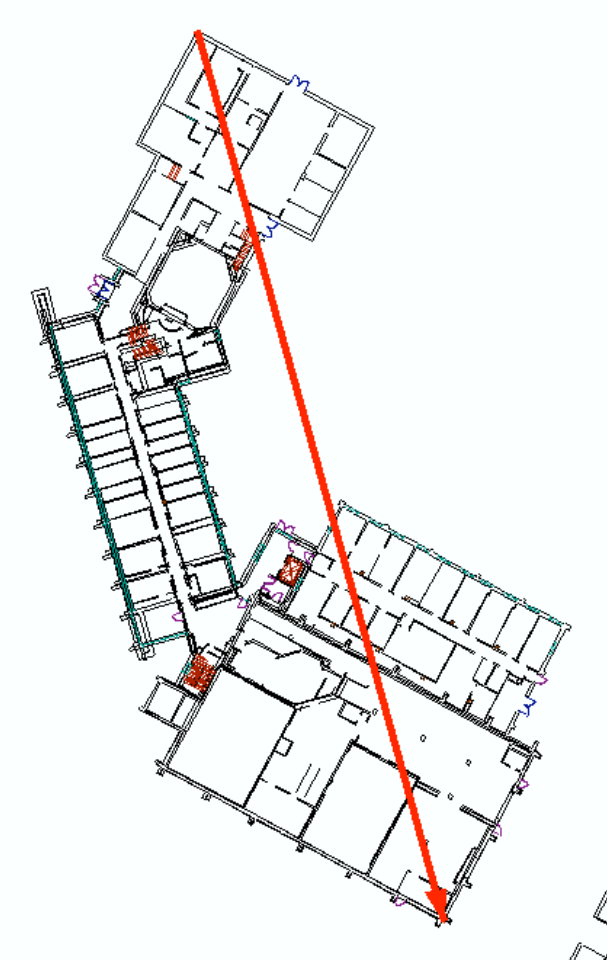


- Grid of all floor plans
- Single layer for each feature

Spatial Transformation

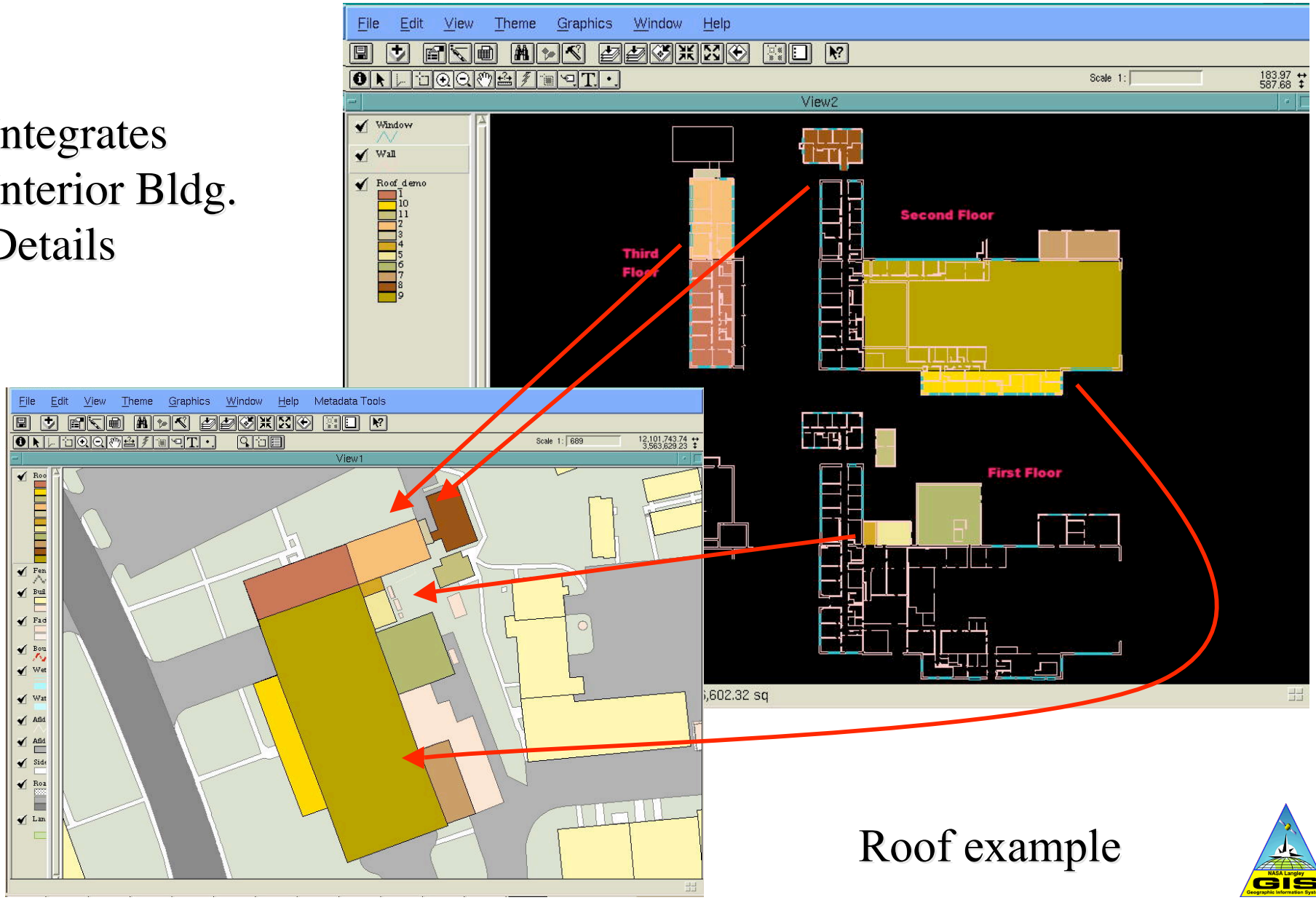
- Just need a corresponding pair of lines for each floor
  - Drawing coordinates
  - Georeferenced





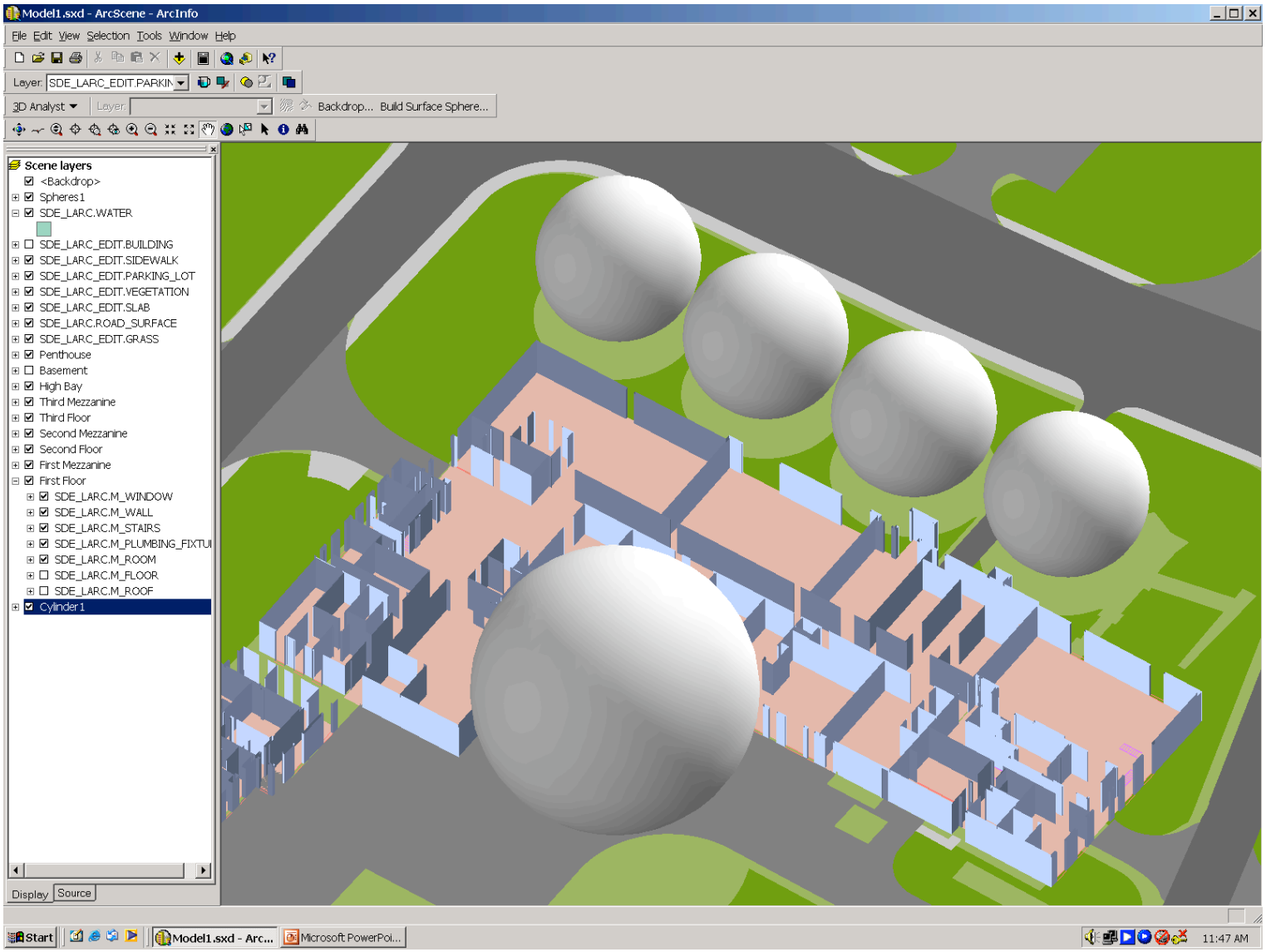
Mapping Floorplans

Integrates
Interior Bldg.
Details



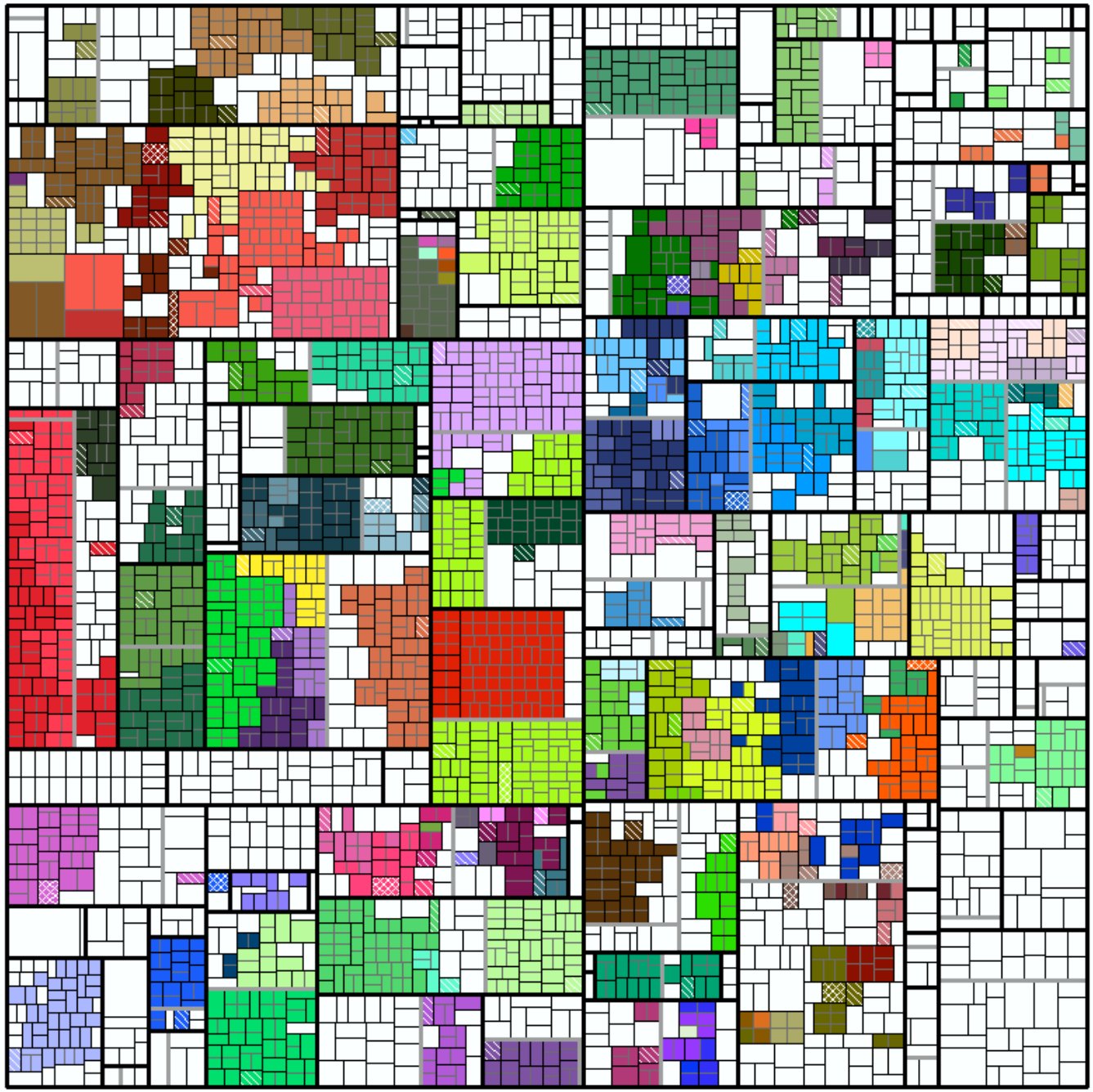
Roof example

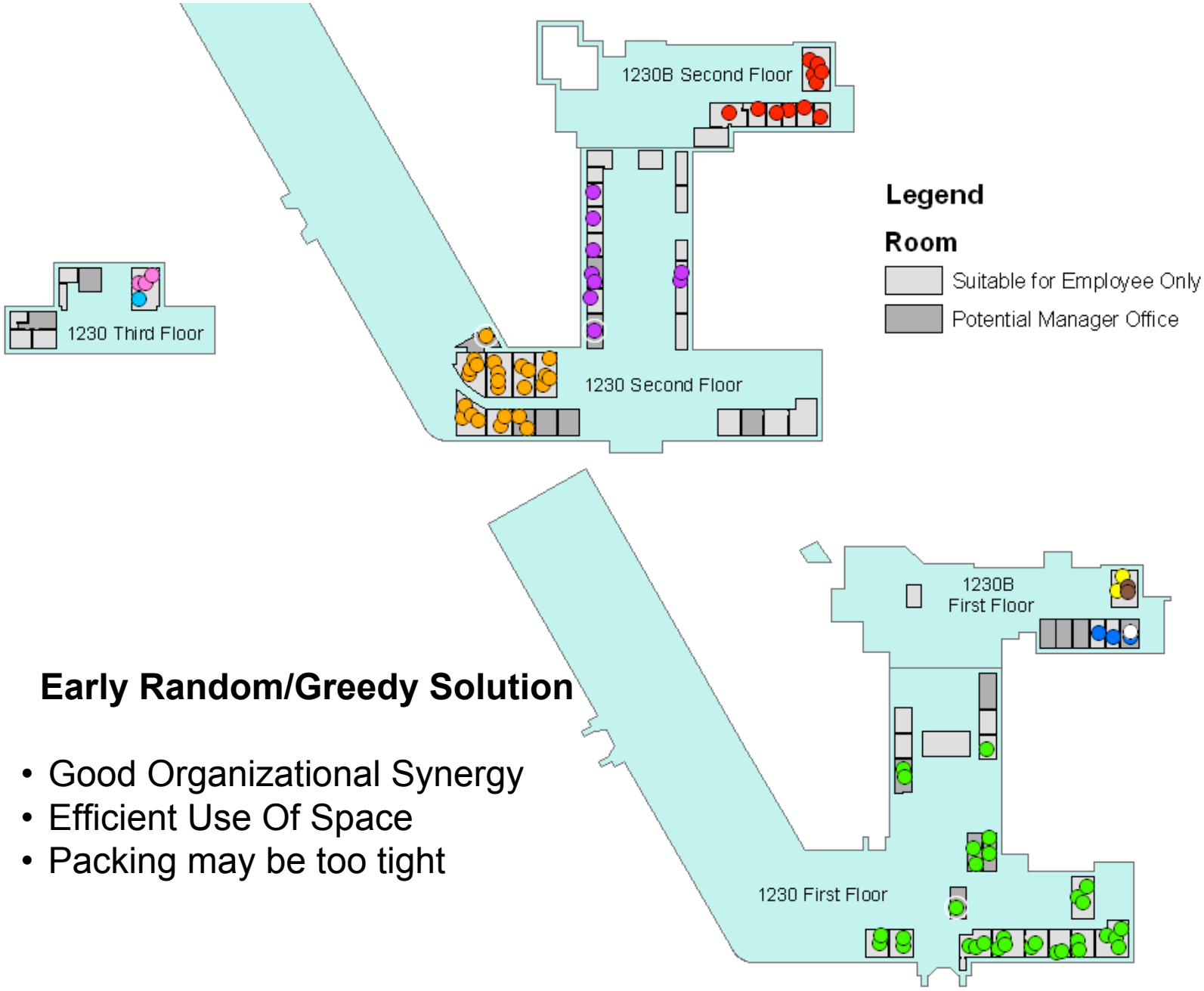
Future Data Management and Analysis



Spatial
Subdivision
Diagram

After
Optimization





Early Random/Greedy Solution

- Good Organizational Synergy
- Efficient Use Of Space
- Packing may be too tight

One ~~NASA~~ Gov.

Partnering with Other Centers and Agencies

ConITS II

Procurement Specifics and Due Diligence

Robert J. Rice

Office of Procurement

Evaluation Factors

- Evaluation Factors
  - Factor 1: Mission Suitability
  - Factor 2: Cost
  - Factor 3: Past Performance
    - Written Proposal and Questionnaires will be required to be submitted 2 weeks prior to the submission of proposals
- Relative Importance of Evaluation Factors and Significant Subfactors
  - Mission Suitability, Cost and Past Performance will be of essentially equal importance
  - All evaluation factors, other than Cost, when combined, are significantly more important than Cost

Procurement Information

- Once the TOR is released, all communication must be in writing and directed to LaRC. LaRC focal point is Robert Rice, or in his absence, Rosemary Froehlich, Head, Research & Projects Contracting Branch.
- GSA will be the Selection Official
- Selection to be based on Best Value where the combined factors of Technical and Past Performance will be significantly more important than cost
- Cost-Plus-Fixed Fee
- Task Assignments will be issued

Procurement Information

- **Contract Period of Performance**
  - –Base Period
    - Base period: 12 Months
    - Options: Four 12 month option periods (FAR 52.217-8, “Option to Extend Services”)
  - –Estimated Procurement Schedule:
    - Task Order Award: February 27, 2009
    - Contract Start: March 9, 2009
- **Task Assignments**
  - –Task assignments can be issued up through the last day of the period of performance

Government-Furnished Property (GFP)

- Office space and furniture will be provided on-site at LaRC for contract performance when the Task Assignment requirements necessitate the Contractor's physical presence
- Contractor is required to use ODIN for desktop systems and off-site connectivity to be used on Task Order
- Due to the developmental nature of this contract, special purpose hardware and/or software may be made available for use by the Contractor on a task assignment basis

Due Diligence Period

- The objective of the due diligence period is to afford prospective offerors an opportunity to be come familiar with Langley Research Center (LaRC) and its relevant IT requirements
- Period is October 20 –29, 2008
- Prospective offerors can meet with Points of Contact (POCs) for current task assignments on CONITS contract
- Up to 3 people from each offeror team may be at LaRC at any given time – they do not have to be the same people for the entire 2 weeks
- Nor later than October 22, 2008, the contractor must provide the Contracting Officer with the names and citizenship information for all individuals who will be at LaRC and the dates they will be at LaRC

Ground rules for Due Diligence

- The Government POCs may disclose the following information upon request
  - The type of work or product required
  - The types of equipment used
  - The current and projected workload
  - The government's organization and role in the work to be performed
  - The current task areas supported by the incumbent contractor
  - Facts – avoid giving opinions (e.g., how you think performance could be improved)
  - The approximate current task assignment value – not the Government estimate of the upcoming procurement

Ground rules for Due Diligence

- The Government POCs may not disclose the following information:
  - Information proprietary or confidential to the incumbent contractor. This type of information includes employee names, salaries, fringe benefits, personnel policies, organization structure, subcontractors, and cost data such as burden rates. When in doubt, call the Contracting Officer.
  - The performance of an incumbent contractor
  - The information that will be in the Task Order Request (TOR)
  - If the TAM is uncertain or uncomfortable with answering a question, they will advise the potential offeror that they will consult with the Contracting Officer and get back to the offeror

Ground rules for Due Diligence

- Meetings should be scheduled at the POCs' convenience, but between October 20 – 29
- The POCs will be instructed to be as consistent as possible in the answers and the level of detail which is provided to each offeror
- The questions and answers provided during one-on-one discussions do not have to be provided to all potential offerors.
- The philosophy is that every potential offeror has an equal opportunity to ask questions.
- The TM's will avoid giving personal facility tours. All offerors will be invited to any facility tour

Caveat and Caution!

- The questions and answers provided during one-on-one discussions will not be provided to all potential offerors.
- However, every potential offeror has an equal opportunity to ask questions and will be given the same level of information to the extent possible
- If any question or answer impacts the Task Order Request (TOR) itself, it will be sent out to all offerors
- TM's have been advised to give facts, not opinions.
- However, the offerors are cautioned that any opinions that might be given by the POCs do not necessarily represent LaRC's position

Tour

- 1:15 to 4:00
- Building 1268 Complex
- Four persons per Contractor Team
- Meet in R2120 at 1:15
- GEOLAB/DVAL 1:30—2:15
- R1100 2:15—2:30
- ATOL 2:30—3:15
- 2nd Floor Computer Rooms 3:15—4:00